REMEDIAL SITE ASSESSMENT DECISION - EPA REGION IV

29711

Site Name: NAVETELL **EPA ID#:** FLD118624188

Alias Site Names: ____________________

City: FT.LAUDERDALE **County or Parish:** Broward **State:** Florida

Refer to Report Dated: 7/26/94 **Report type:** SIP

Report developed by: BVWST

DECISION:

|xx| 1. **Further Remedial Site Assessment under CERCLA (Superfund) is not required because:**

|XX| 1a. Site does not qualify for further remedial site assessment under CERCLA (No Further Remedial Action Planned-NFRAP)

| | 1b. Site may qualify for further action, but is deferred to: | | RCRA | | NRC

| | 2. **Further Assessment Needed Under CERCLA:** 2a. (optional) Priority: | | Higher | | Lower

2b. Activity Type: | | PA | | SI | | ESI | | HRS evaluation

| | Other: ____________________

DISCUSSION/RATIONALE: The facility sold and repaired data communications test equipment. Cleaning solvents were used in the process, approx. 20 gallons per year. wastes were placed in containers and disposed via municipal pick-up. Start-up date not reported in SI, but ceased operations in 1985. Site now a landscaped office park. The nearest wellhead is 100 ft north.

SI samples identified arsenic (40ppb) and nickel (10ppb) in shallow mw (25ft deep) background samples were nondetect. The MCL for arsenic in gw is 5ppb, nickel is 10ppb. Nickel could possibly be attributed to the site. Arsenic however is not suspected to be a waste product of the NAVTELL operations. The site is located approx.1800 ft from the western boundary of the Ft.Lauderdale Executive Airport in a mixed commercial/industrial/residential land use area.

This site is judged to not be of NPL caliber. Further, using a conservative one year estimate of 20 gallons of liquid waste per year, the HRS waste qty would be zero. Therefore the site does not score above 28.50.

Report Reviewed and Approved by: Deborah A.Vaughn-Wright Signature: D. Vaughn-Wright Date: 1-11-95

Site Decision Made by: Deborah Vaughn-Wright Signature: D. Vaughn-Wright Date: 1-11-95

EPA Form # 9100-3

Navtell
Fort Lauderdale, Broward County, Florida
EPA ID No. FLD049884828
WasteLAN No. 00654

Black & Veatch Waste Science, Inc., (Black & Veatch) was tasked by the U.S. Environmental Protection Agency (EPA) to perform a Specialized Site Inspection Prioritization study for Navtell in Fort Lauderdale, Florida. This specialized study will focus on waste quantity size and will identify sources that are contributing to groundwater contamination in Broward County, Florida.

Navtell was located at 3331 N.W. 55th Street in Fort Lauderdale, Broward County, Florida, more specifically, 26°11'37" N. latitude and 80°11'39" W. longitude.

Navtell repaired and sold data communications test equipment. Cleaning solvents and soldering were involved in the processes. The facility used approximately 20 gallons of cleaning solvents per year. The spent solvents were placed in small containers and collected by municipal trash collectors. There were no spills or leaks reported onsite.

- August 2, 1990, Halliburton NUS Corporation conducted a Screening Site Inspection Phase I. No sampling was conducted at this investigation.

- October 14, 1991, Halliburton NUS Corporation conducted a Screening Site Inspection Phase II. Environmental sampling of surface soil, subsurface soil, and groundwater was conducted at this investigation.

Analysis of surface soil samples from the 1991 investigation identified lead and trichloroethene as contaminants. Analysis of groundwater samples detected arsenic and nickel at elevated quantities.

BROWARD COUNTY
TABLE OF SOURCE AND GROUNDWATER CONTAMINANTS

Site Name	Topographic Map Quadrangle	Depth of Well	Well Type	Filtered N or Y	Groundwater Contaminants	Concentrations	Sources/Size	Source Contaminants	Concentrations
Navtell	North Ft. Lauderdale	25 ft. bls	M	N	arsenic	40 μg/L	Contaminated Soil/Unknown Quantity	lead	8.9 mg/kg
					nickel	18 μg/L		trichloroethene	10J μg/kg

T Temporary Well
M Monitoring Well
PM Potable Municipal Well
PP Potable Private Well
J Estimated Value
Shaded areas denote values attributable to the source.

PROTECTI[illegible]

[illegible]

[illegible] STREET, N.E.
[illegible] A 30365

NAV TELL
FLD 118624188

4WD-RPB

Date: FEB. 4, 1992 (LMS)

Mr. Lee Tomback
3449 NW 55th Street
Ft. Lauderdale, Fl. 33309

Dear Mr. Tomback

Please find enclosed a copy of the Site Investigation Report for your records.

Should you have any questions, please call me at (404) 347-5065.

Sincerely,

Tillman McAdams

Enclosure

NOTICE

The information in this document has been funded wholly by the United States Environmental Protection Agency (EPA) under Contract Number 68-01-7346 and is considered proprietary to the EPA.

This information is not be released to third parties without the expressed or written consent of the EPA.

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

The Navtell facility was located in a mixed commercial/industrial and residential area of Fort Lauderdale, Broward County, Florida. Operations began prior to 1984 and ceased by 1985. The facility repaired and sold data communications test equipment. Cleaning solvents and soldering were involved in Navtell's processes. The spent solvents were packaged and collected by municipal trash collectors.

Broward County is located in the Atlantic Coastal Plain physiographic province. The facility is underlain by several highly permeable formations of sandstone and limestone that comprise the Biscayne aquifer, a sole-source aquifer. The Biscayne aquifer is underlain by the Hawthorn Group, which is a confining unit underlain by the Floridan aquifer. The Floridan aquifer is undeveloped as drinking water source in the area due to its high salinity.

The groundwater pathway is of concern at this site. There are nine municipal wellfields located within the 4-mile radius, the nearest being located 100 feet north of the site. These wellfields serve approximately 152,250 connections. The surface water, air, and soil exposure pathways are of minimal concern at this site. Run-off from the site is directed to a storm drainage system that allows the surface water to percolate into the ground. Also, the site is completely paved, which minimizes the chances of particulates becoming airborne or coming in contact with the soil.

A total of eight environmental samples were collected for this investigation. Analytical results indicated no organic compounds included on the Target Compound List (TCL) were present at elevated concentrations in any of the soil or groundwater samples collected on site. However, unidentified extractable compounds were present in onsite subsurface and surface soil samples. The only elevated TCL inorganic constituent present in onsite soil samples was lead, detected in one sample at a concentration of 4 times the control sample. Groundwater samples collected from monitor well NV-MW-02 contained concentrations of arsenic, chromium, and lead exceeding federal drinking water standards.

Based on the results of this investigation, and the above referenced material has determined that the risks associated with this site are minimal, FIT 4 does recommend, however, that Navtell be evaluated using the HRS (effective March 14, 1991).

1.0 INTRODUCTION

The HALLIBURTON NUS Environmental Corporation Region 4 Field Investigation Team (FIT) was tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Site Inspection (SI) at the Navtell site in Fort Lauderdale, Broward County, Florida. The investigation was performed under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). The task was performed to satisfy the requirements stated in Technical Directive Document (TDD) number F4-9102-04. The field investigation was conducted during the week of March 20, 1991.

1.1 OBJECTIVES

The objectives of this inspection were to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection sought to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation was made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review relevant background materials.
- Evaluate target populations and environments associated with the groundwater, surface water, air, and soil exposure pathways.
- Determine location of and distance to nearest potable well.
- Develop a site sketch.
- Collect environmental samples.

2.0 SITE CHARACTERIZATION

2.1 SITE HISTORY

The Navtell facility was located at 3331 N.W. 55th Street, in the Two Prospect Park complex, Fort Lauderdale, Broward County, Florida (26°11'37" N latitude, 80°11'39" W longitude) (Figure 1) (Refs. 1, p. 1; 2, p. 5). A site location map is shown in Figure 1, and a site layout map is shown in Figure 2The facility was located approximately 1,800 feet from the western boundary of the Fort Lauderdale Executive Airport in a mixed commercial/industrial/residential land use area (Appendix A). The property is currently owned by C.B. Institutional Fund VI (Ref. 2, p. 7). Farbman-Stein Management Company manages the office complex (Ref. 2, p. 3).

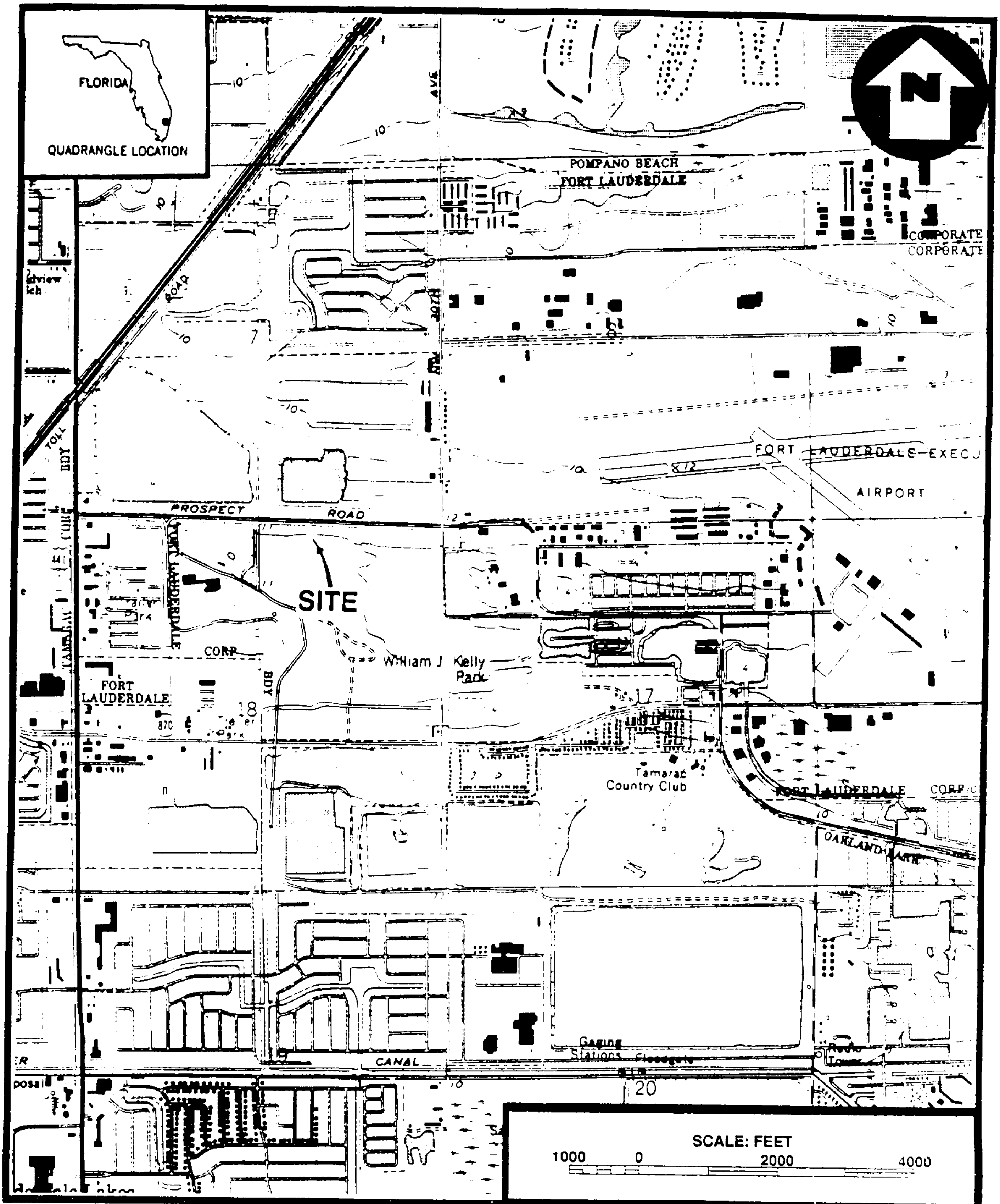
The Navtell facility sold and repaired data communications test equipment. Navtell began operations prior to 1984 and ceased operations at this location by 1985 (Ref. 1, pp. 1, 3). Navtell used cleaning solvents as part of the repair process. There were no spills or disposals reported on site. The Broward County Environmental Quality Control Board (BCEQCB) conducted two offsite inspections of the Navtell facility on August 9, 1984 and August 14, 1985, with no violations noted (Ref. 1). The facility did not file a RCRA Part A application (Ref. 3). Spent solvents were placed in small containers until retrieved by municipal trash collectors. Some soldering was also performed at this facility (Ref. 1, p. 1).

2.2 SITE DESCRIPTION

2.2.1 Site Features

The Navtell facility occupied approximately 1,624 square feet of Building 13, located within the Two Prospect park office complex (Ref. 4). The facility and nearby land are relatively flat (Appendix A).

The facility was located in one of eight buildings that are part of the Two Prospect Park office complex (Refs. 2, 4). Two permanent monitoring wells, both drilled to a depth of 25 feet below land surface (bls), exist at the northern border of the Two Prospect Park office complex (Ref. 5, pp. 8, 10). Asphalt parking lots surround the entire complex. Unpaved areas containing landscaping and grass

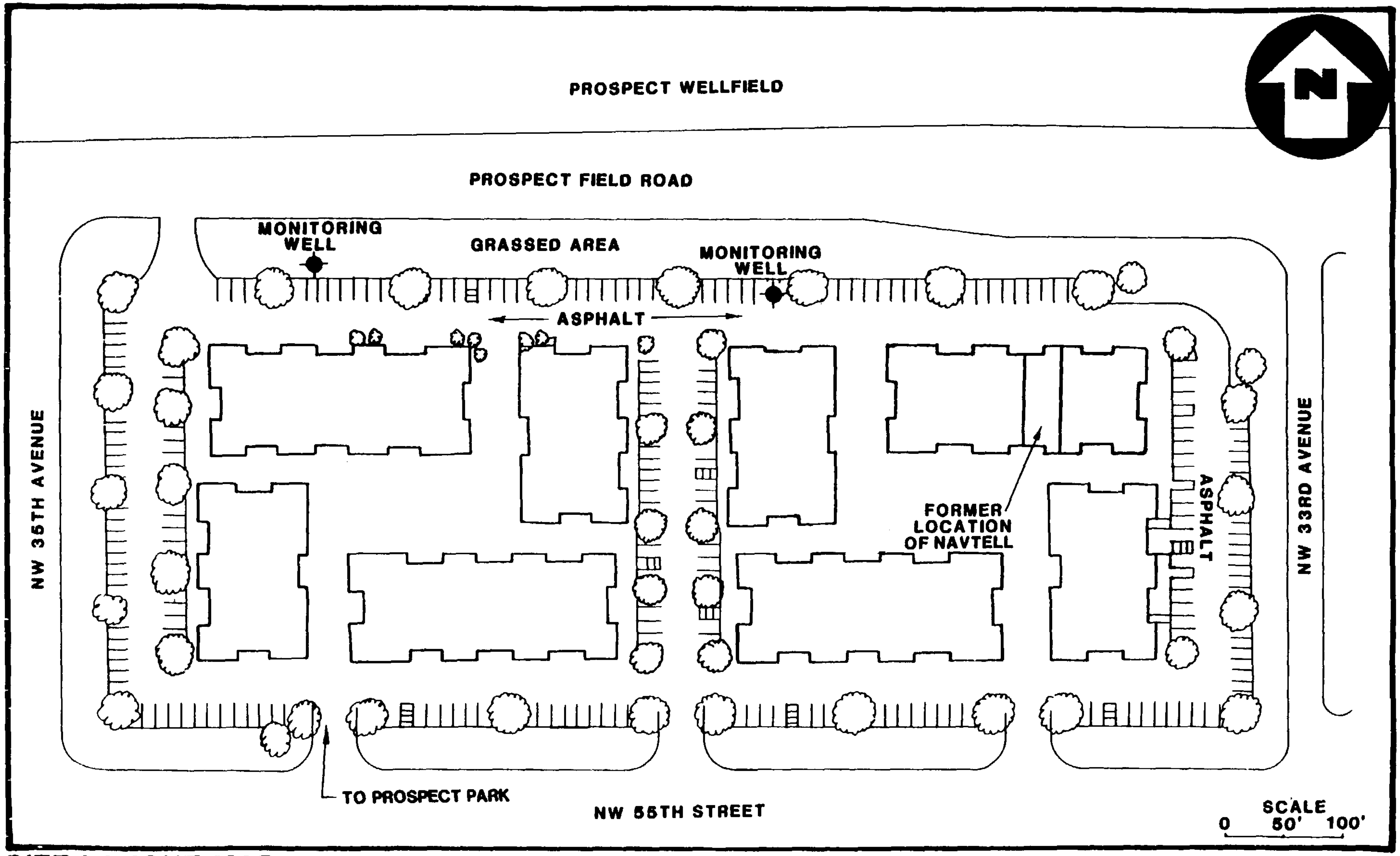


BASE MAP IS A PORTION OF THE USGS 7.5 MINUTE QUADRANGLE, FORT LAUDERDALE NORTH, 1983.

SITE LOCATION MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 1

NUS CORPORATION



SITE LAYOUT MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 2

NUS CORPORATION

exist outside of the parking areas and around the individual buildings. No gates or other security measures are in place to limit access to the building (Ref. 4).

2.2.2 Waste Characteristics

The Navtell facility was involved in the repair and sales of data communications test equipment. The facility used approximately 20 gallons per year of cleaning solvents in their processes; however, the chemical composition of these solvents is unknown. The soldering of electrical components also took place at the Navtell facility. Spent solvents were contained in various small containers and disposed of through municipal trash collections (Ref. 1, p. 1).

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

Navtell is located in a mixed commercial/industrial/residential area. The immediate area is densely populated. The total population within a 4-mile radius, according to 1980 census data is 213,069. The population distribution is 1,938 between 0 and 1 mile; 32,907 between 1 and 2 miles; 55,165 between 2 and 3 miles; and 55,165 between 3 and 4 miles (Ref. 6). The nearest residential area is located approximately 0.4 mile to the west. The nearest school is Broadview School, located approximately 1 mile to the northwest (Appendix A).

3.1.2 Land Use

The portion of land within a 0.4 mile radius of Navtell is in a mixed commercial/industrial and residential area. There are approximately nine parks located within a 4-mile radius of the facility. Wetland areas are located 1.6 miles to the north and within 2.7 miles to the west (Appendix A). The Fort Lauderdale Utilities Wellfield is located 100 feet north of the facility (Appendix A).

Several endangered and threatened species may be found within 4 miles of the facility. The federally threatened eastern indigo snake (Drymarchon corais couperi) is found in an area 1.2 miles northeast of the facility and in the Fern Forest Nature Center, 2.2 miles north of the facility (Refs. 7, 8, p. 3; Appendix A). The state-designated endangered hand adder's tongue fern (Ophioglossum palmatum) is also found in the Fern Forest Nature Center (Refs. 9; pp. 44, 45; 10). The bird's-nest spleenwort (Asplenium serratum) and the star-scale fern (Pleopeltis revoluta), both state-designated endangered species, may also be found in the area (Ref. 9, pp. 9, 49, 50).

3.2 SURFACE WATER

3.2.1 Climatology

The climate of Broward County is subtropical and is characterized by warm, humid summers and short, mild winters. The average temperature is 75.5°F in the winter and 89.0°F in the summer. Approximately 65 percent of this area's annual rainfall occurs between June and October. The dry season is November through March (Ref. 11, p. 42). Based on the average annual precipitation (63 inches) and the average annual lake evaporation (50 inches), the net precipitation for this area is 13 inches (Ref. 12, pp. 43, 63). The 2-year, 24-hour rainfall is 5.8 inches (Ref. 13, p. 95).

3.2.2 Overland Drainage

Surface water run-off from the facility is directed to drains built into the asphalt-paved areas and carried off site by a storm drainage system (Ref. 5). The drainage system is a French drain-type that discharges run-off directly into the surrounding porous soils without prior treatment (Ref. 14).

3.2.3 Potentially Affected Water Bodies

Since surface water from the facility is collected in a drainage system that directs run-off to the groundwater by infiltration through the soil, water bodies along the 15-mile migration pathway are not affected.

3.3 GROUNDWATER

3.3.1 Hydrogeology

The facility is located in the Atlantic Coastal Ridge region of the Coastal Plain physiographic province (Ref. 15, plate 1-C). Topographically, a large portion of this area is flat lying, although low ridges parallel the eastern shoreline. In general, the area exists at low altitudes as elevations in Broward County typically range between 2 and 10 feet above mean sea level (amsl). There are very few naturally occurring streams. Instead, a network of manmade canals serves to control surface water run-off and induce groundwater seepage, through which groundwater elevations in the Biscayne aquifer are lowered (Ref. 11, pp. 1, 44-45). Broward County is underlain by the Biscayne aquifer, which is a sole-source aquifer (Refs. 16, p. 3; 17) Surface soil in the area consists primarily of fine sands (Ref. 11, sheet 8, Index).

The Biscayne aquifer is a highly permeable, wedge-shaped, unconfined aquifer that is about 300 feet thick. In eastern Broward County, the aquifer is thickest in the east and thins to the west. The Biscayne aquifer underlying the facility consists of the Pamlico Sand (quartz sand), the Anastasia Formation (sandstone and limestone), the Key Largo Limestone (coralline reef rock), and the Tamiami Formation (limestones, sands, and marls) (Refs. 16, p. 3; 18, sheets 1, 2). Based on available borehole data, the Key Largo Limestone appears to be areally discontinuous in the Executive Airport area. Recharge to the Biscayne aquifer is primarily through rainfall. Downward infiltration of rainwater is rapid due to the presence of highly permeable sandy soils along the coast, as well as the presence of the solution cavities and conduits in the limestone (Ref. 16, p. 15). In southern Florida, at least one-fourth of the limestone rock is cavernous with interconnecting solution cavities, which are generally filled with sand (Ref. 19, p. 133). The water table slopes eastward toward the coast; however, locally, the direction of groundwater flow in the Biscayne aquifer may be influenced by drainage canals and wellfields (Refs. 16, pp. 3, 15; 18, sheets 1, 2). Water-table depth around the facility ranges from approximately 1 to 9 feet below land surface (bls) (Ref. 20, pp. 30, 31).

Wells completed in the Biscayne aquifer are an average of 80 to 120 feet bls and provide all municipal water supplies for Broward County (Ref. 17). Transmissivity of the Biscayne aquifer ranges from 5.4×10^4 to 4.0×10^5 ft^2/day, and storage coefficients are as high as 3.4×10^{-1} (Ref. 16, pp. 3, 8). Hydraulic conductivity ranges from 6.5×10^3 to 9.38×10^3 ft/day along coastal Broward County (Ref. 20, p. 39).

Below the aquifer of concern is the Hawthorn Group, a confining unit present in the site area. The majority of the Hawthorn is predominantly comprised of siliciclastics; however, there is a carbonate unit in the lower portion of the group (Ref. 21, p. 56). In Broward County, the Hawthorn Group consists of, in descending order, the Peace River and Arcadia Formations (Ref. 21, pp. 55, 67, 83). The Peace River Formation is comprised of quartz sands, clays, and carbonates. Approximately two-thirds of the formation is siliciclastics with carbonate beds scattered throughout (Ref. 21, p. 79). The Arcadia Formation consists primarily of limestones and dolostones that contain sand (quartz) and phosphate, and are often clay rich (Ref. 21, p. 56). In the site area, the Peace River Formation is approximately 300 feet thick, and the Arcadia Formation is about 400 feet thick (Ref. 21, pp. 67, 83). In areas where the underlying Floridan aquifer is tightly confined by the Hawthorn Group, model-derived leakage coefficient values for the Hawthorn average approximately 0.01 in/yr/ft (Ref. 22, p. A12).

Beneath the Hawthorn Group are sedimentary units which comprise the Floridan Aquifer System (Refs. 21, p. 55; 23, p. B44). The Floridan aquifer is a sequence of carbonate rocks, primarily limestones in the upper two-thirds, and dolostones with evaporite beds in the lower portion. These carbonate rocks of the Floridan aquifer are generally highly permeable and are hydraulically connected in varying degrees (Ref. 23, p. B45).

The Floridan Aquifer System consists of an upper and lower aquifer with a middle confining unit (Ref. 23, pp. B18-B33, B44-B45). In this area, the Suwannee Limestone, Ocala Group, and the upper third of the Avon Park Formation comprise the upper Floridan aquifer. The middle confining unit consists of low-permeability sediments, which constitute the middle third of the Avon Park Formation. The lower Floridan aquifer is comprised of the lower third of the Avon Park Formation and the Oldsmar and Cedar Keys Formations (Ref. 23, pp. B44, B47). Located in the lower portion of the Floridan aquifer is a highly permeable, cavernous unit, termed the Boulder zone (Ref. 22, p. A8).

The entire Floridan Aquifer System is approximately 2,800 feet thick in the site area (Ref. 23, plate 27). Transmissivities range from 1.0×10^4 to 5.0×10^4 ft^2/day for the majority of the aquifer, but aquifer tests in the Boulder zone have suggested transmissivities greater than 3.0×10^6 ft^2/day (Ref. 22, pp. A11-A12). Storage coefficients for the upper Floridan range from 1×10^{-5} to 2×10^{-2} (Ref. 22, p. A12). The potentiometric surface of the artesian Floridan aquifer is approximately 40 to 50 feet amsl. The regional groundwater flow direction in the Floridan aquifer is east toward the coast (Ref. 23, p. B51). The aquifer is approximately 1,000 feet bls and is undeveloped as a drinking water resource due to its high salinity (Refs. 18, sheets 1, 2; 21, pp. 67, 83; 22, p. A8).

3.3.2 Aquifer Use

The aquifer of concern is the highly permeable, unconfined, sole-source Biscayne aquifer. The Biscayne aquifer supplies all municipal water systems in the area (Ref. 16, p. 3). Depths of most municipal wells range from 80 to 100 feet (Ref. 17).

A total of 11 municipal wellfields are located within about 5 miles of the site. Nine of these lie in the 4-mile site radius and serve approximately 152,250 connections. The nearest wellfield is the Fort Lauderdale Wellfield located 100 feet north of the site. All these municipal systems have emergency connections with other systems in the area. Some systems have multiple wellfields, with some wellfields located over 4 miles from the site. In all cases, however, water is mixed prior to distribution (Ref. 17).

More detailed information on the potentially affected wellfields, including the number of connections and locations relative to the site, is presented in Table 1. All wellfields located within 4 miles are marked on Appendix A.

TABLE 1

POTENTIALLY AFFECTED WELLFIELDS
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Wellfield/System Name	Number of Wellfields	Number of Wells	Number of Connections	Wellfield Direction from Site	Wellfield Distance from Site (miles)
BCUD*-1A	1	7	10,843	Southwest	1.7
BCUD*-1B	1	5	3,397	East-northeast	2.9
Broadview	1	3	2,185	Northwest	0.8
Fort Lauderdale	2	43	56,000	North	<0.1
Hallandale	1	2	5,500	Southeast	>4
Lauderhill	1	7	8,600	Southwest	3.2
Margate	2	12	23,723	North-northwest	3.3
North Lauderdale	1	3	6,328	Northwest	2.0
Oakland Park**	0	0	2,700	NA	NA
Pompano Beach	2	22	16,900	Northeast	2.8
Sunrise	3	28	29,742	Southwest	>4
Tamarac	1	13	17,074	West	3.4
Wilton Manors**	0	0	4,500	NA	NA

* Broward County Utilities Division
** Potable water supplied by Fort Lauderdale
NA Not Applicable

4.0 FIELD INVESTIGATION

4.1 SAMPLE COLLECTION

During the field investigation, conducted the week of March 20, 1991, FIT 4 attempted to identify and characterize contaminants which may be present in the environment as a result of activities that were conducted at Navtell. To accomplish this, FIT 4 collected environmental surface soil, subsurface soil, and groundwater samples from a number of strategic locations. These locations were selected based on historical information, hydrogeological data for the region and site area, and direct observation at the site.

4.1.1 Sample Collection Methodology

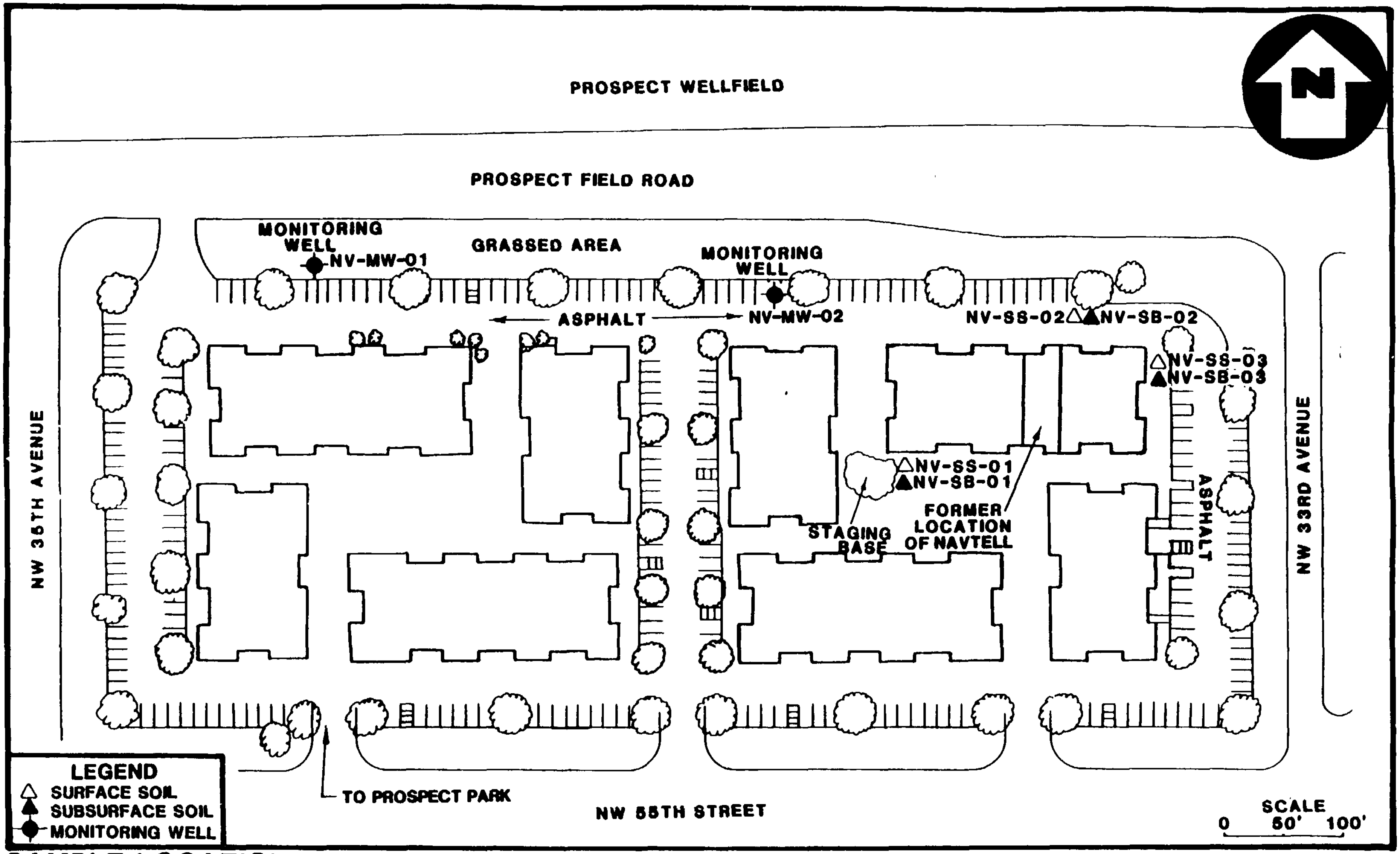
All sample collection, sample preservation, and chain-of-custody procedures used during this investigation were in accordance with the standard operating procedures as specified in Sections 3 and 4 of the Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual; U.S. Environmental Protection Agency, Region IV, Environmental Services Division, February 1, 1991.

4.1.2 Duplicate Samples

Duplicate samples were offered to and declined by Ken Karaczewski, a designated representative of Farbman-Stein Management Company. Receipt for sample forms are on file at FIT 4.

4.1.3 Description of Samples and Sample Locations

During the sampling investigation, a total of eight environmental samples were collected. Control surface soil (NV-SS-01) and subsurface soil (NV-SB-01) samples were collected from the southwest corner of the building which formerly housed Navtell. A control groundwater sample (NV-MW-01) was collected from a monitoring well located approximately 600 feet west of the former Navtell facility. All sample locations are shown in Figure 3. Sample codes, descriptions, locations, and rationale are contained in Table 2.



SAMPLE LOCATION MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 3

NUS CORPORATION

4.1.4 Field Measurements

Field measurements were recorded for the groundwater samples (Table 3). Parameters measured included temperature, pH, and conductivity of the sample at time of collection. No field measurements were performed on the soil samples during this investigation.

4.2 SAMPLE ANALYSIS

4.2.1 Analytical Support and Methodology

All samples collected were analyzed under the Contract Laboratory Program (CLP) and analyzed for all inorganic and organic parameters listed in the Target Compound List (TCL). Organic analysis of soil and water samples was performed by National Environmental Test of Bartlett, Illinois. Inorganic analysis of soii and water was performed by Skinner & Sherman of Waltham, Massachusetts.

All laboratory analyses and laboratory quality assurance procedures used during this investigation were in accordance with standard procedures and protocols as specified in the Laboratory Operations and Quality Control Manual, U.S. Environmental Protection Agency (EPA), Region IV, Environmental Services Division, October 24, 1990; or as specified by the existing EPA standard procedures and protocols for the CLP Statement of Work, as applicable.

4.2.2 Analytical Data Quality and Data Qualifiers

All analytical data were subjected to a quality assurance review as described in the EPA Environmental Services Division laboratory data evaluation guidelines. In the tables, some of the concentrations of the organic and inorganic parameters have been flagged with a "J". This indicates that the qualitative analysis was acceptable, but the quantitative value has been estimated. A few other compounds are flagged with an "N", indicating that they were detected based on the presumptive evidence of their presence. This means that the compound was tentatively identified, and its detection cannot be used as positive identification of its presence. Results for some control samples are reported with a "U" flag. This flag means that the material was analyzed for but not detected. The reported number is the laboratory-derived minimum quantitation limit (MQL) for the compound or element in that sample. At times, miscellaneous organic compounds that do not appear on the target compound list are reported with a data set. These compounds are labeled as "JN", indicating that they are tentatively identified at estimated quantities. Because these compounds are not routinely analyzed for or reported, control levels or MQL values are not generally available for comparison. The soil trip blank was found to contain acetone (590J ug/kg), and two

TABLE 2

SAMPLE CODES, DESCRIPTIONS, LOCATIONS, AND RATIONALE
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
NV-SS-01	Surface Soil	Collected about 3 feet south from the southwest corner of Building #13, which formerly housed the facility, at a depth of 8" below land surface (bls)	To establish control conditions
NV-SS-02	Surface Soil	Collected about 50 feet north of Building #13 at a depth of 6" bls	To determine the presence or absence of contaminants
NV-SS-03	Surface Soil	Collected about 20 feet east of Building #13 at a depth of 12" bls	To determine the presence or absence of contaminants
NV-SB-01	Subsurface Soil	Collected about 3 feet south from the southwest corner of Building #13 at a depth of 6.5' bls	To establish control conditions
NV-SB-02	Subsurface Soil	Collected about 50 feet north of Building #13 at a depth of 9' bls	To determine the presence or absence of contaminants
NV-SB-03	Subsurface Soil	Collected about 20 feet east of Building #13 at a depth of 6' bls	To determine the presence or absence of contaminants
NV-MW-01	Groundwater	Existing monitoring well approximately 25 feet deep located about 60 feet north of Building #7, which is at the northwest corner of Two Prospect Park, and about 600 feet west of the former facility	To establish control conditions
NV-MW-02	Groundwater	Existing monitoring well approximately 25 feet deep located about 60 feet north and 75 feet west of Building #13 which formerly housed the facility	To determine the presence or absence of contaminants

NV - Navtell
SS - Surface Soil
SB - Subsurface Soil
MW - Groundwater, Monitoring Well

TABLE 4

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

PARAMETERS (mg/kg)	Surface Soil Samples			Subsurface Soil Samples		
	Control	North	East	Control	North	East
	NV-SS-01	NV-SS-02	NV-SS-03	NV-SB-01	NV-SB-02	NV-SB-03
ALUMINUM	1400	1700	1200	1200	1400	1800
BARIUM	7.2	11	8.8	3.1	6.4	4.2
CALCIUM	150,000	75,000	86,000	66,000	140,000	70,000
CHROMIUM	3.9	7.6	3.2	4.2	4.6	5.2
IRON	780	390	1800	660	800	1000
LEAD	2	3.9	8.9	2.4	3.5	3.3
MAGNESIUM	700	250	420	240	580	250
MANGANESE	11	11	18	3.2	8.4	4.7
POTASSIUM	57	79	70	30U	-	62
VANADIUM	4.9	2.3	2.7	1.9	2.5	2.3

- Material analyzed for but not detected above minimum quantitation limit (MQL).

U Material was analyzed for but not detected. The number given is the MQL.

TABLE 5

SUMMARY OF ORGANIC ANALYTICAL RESTULS
SOIL SAMPLES
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

PARAMETERS (ug/kg)	Soil Trip Blank	Surface Soil Samples			Subsurface Soil Samples		
		Control	North	East	Control	North	East
	NV-TB-01S	NV-SS-01	NV-SS-02	NV-SS-03	NV-SB-01	NV-SB-02	NV-SB-03
PURGEABLE COMPOUNDS							
TRICHLOROETHENE	-	5U	-	10J	5U	-	-
BIS(DIMETHYLETHYL)CYCLOHEXADIENEDIONE(1)					6JN		
ACETONE	590J	9U	-	-	-	-	-
UNIDENTIFIED COMPOUNDS/NO.(1)	20J/2	10J/1					
EXTRACTABLE COMPOUNDS							
UNIDENTIFIED COMPOUNDS/NO.(1)			4000J/10	1000J/1			5000J/4
PESTICIDE\PCB COMPOUNDS							
HEPTACHLOR EPOXIDE	-	18U	3.3J	-	-	-	-
DIELDRIN	-	35U	4.3J	-	-	-	-
4,4'-DDT (P,P'-DDT)	-	35U	8.6J	-	-	-	-
GAMMA-CHLORDANE	-	180U	61J	-	-	-	-
ALPHA-CHLORDANE	-	180U	45J	-	-	-	-

- Material analyzed for but not detected above minimum quantitation limit (MQL).
J Estimated value.
N Presumptive evidence of presence of material.
U Material was analyzed for but not detected. The number given is the MQL.
(1) Tentatively identified and unidentified compounds. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.

TABLE 6

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

PARAMETERS (ug/l)	Preservative Blank NV-PB-01	Control NV-MW-01	On Site NV-MW-02
ALUMINUM	-	5900J	17,000J
ARSENIC	-	3U	40
BARIUM	-	120	150
CADMIUM	-	11	2U
CALCIUM	21,000	2,100,000	2,200,000
CHROMIUM	-	26	55
IRON	53	5800	16,000
LEAD	6	13	25
MAGNESIUM	6000	6000	7800
MANGANESE	-	30	83
NICKEL	-	9U	10
POTASSIUM	3000	3600	6400
SODIUM	39,000	41,000	53,000
VANADIUM	-	19	26

- Material analyzed for but not detected above minimum quantitation limit (MQL).

J Estimated value.

U Material was analyzed for but not deteted. The number given is the MQL.

TABLE 7

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

PARAMETERS (ug/l)	Trip Blank NV-TB-01W	Control NV-MW-01	On Site NV-MW-02
PURGEABLE COMPOUNDS			
TRICHLOROETHENE	-	2J	0.5J
BENZENE	-	5U	0.5J
EXTRACTABLE COMPOUNDS			
UNIDENTIFIED COMPOUND/NO (1)			10J/1

- \- Material analyzed for but not detected above minimum quantitation limit (MQL).
- J Estimated value.
- U Material was analyzed for but not detected. The number given is the MQL.
- (1) Tentatively identified and unidentified compounds. This compound is not on Target Compound List and is reported only as detected in individual samples; MQL not determined.

5.0 SUMMARY

The groundwater pathway is of concern at this site. Broward County is underlain by the Biscayne aquifer which is a sole-source aquifer. This highly permeable, unconfined aquifer supplies all the water needs of the population within a 4-mile radius of the site. There are nine municipal wellfields located within the 4-mile radius, the nearest being located 100 feet north of the site. These wellfields serve approximately 152,250 connections. The surface water, air, and soil exposure pathways are of minimal concern at this site. Run-off from the site is directed to storm drains that allow the surface water to percolate into the ground. Also, the site is completely paved which minimizes the chances of population exposure to airborne particles or contaminated soil.

A total of eight environmental samples were collected during this investigation. Analytical results indicated no organic compounds identified on the Target Compound List (TCL) were present at elevated concentrations in either the soil or groundwater samples collected on site. However, unidentified extractable compounds were present in onsite subsurface soil samples. The only elevated TCL inorganic constituent present in onsite soil samples was lead, which was detected at a concentration of 4 times the control sample. Groundwater samples collected from monitor well NV-MW-02 contained concentrations of arsenic, chromium, and lead in excess of federal drinking water standards.

Based on the results of this investigation and the above referenced material, FIT 4 has determined that the risks associated with this site are minimal, FIT 4does recommend, however, that Navtell be evaluated using the HRS (effective March 14, 1991).

REFERENCES

1. Potential Hazardous Waste Site Preliminary Assessment (EPA Form 2070-12) and attachments for Navtell. Filed by Willard Murry, E.C. Jordan Company, November 6, 1985.

2. NUS Corporation Field Logbook No. F4-2345 for Navtell, TDD No. F4-9102-04. Documentation of facility reconnaissance, May 30, 1990.

3. Angela Teagle, U.S. Environmental Protection Agency, Region IV, telephone conversation with Keith Hazen, NUS Corporation, September 11, 1991. Subject: Regulatory History, Navtell.

4. Facility map of Two Prospect Park, Farbman-Stein Management Company, April 4, 1991.

5. NUS Corporation Field Logbook No. F4-2881 for Navtell, TDD No. F4-9102-04. Documentation of sampling investigation, March 20, 1991.

6. U.S. Environmental Protection Agency, Graphical Exposure Modeling System (GEMS) Data Base, compiled from U.S. Bureau of the Census data (1980).

7. Curtis Morgan, "Road Plan Saves Tortoise Habitat," The Miami Herald, April 26, 1990.

8. Don A. Wood, Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida (Tallahassee, Florida: Florida Game and Fresh Water Fish Commission, 1988).

9. Daniel B. Ward, ed., Plants, Vol. 5 in Rare and Endangered Biota of Florida (Gainesville, Florida: University Presses of Florida, 1978).

10. Paddy Cunningham, Fern Forest Nature Center, telephone conversation with William E. Vasser, NUS Corporation, May 3, 1990. Subject: Endangered species found in the Fern Forest Nature Center.

11. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Broward County, Florida (July 1976).

12. U.S. Department of Commerce, Climatic Atlas of the United States (Washington, D.C.: GPO, June 1968) Reprint: 1983, National Oceanic and Atmospheric Administration.

13. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40 (Washington, D.C.: GPO, 1961).

14. Steve Anderson, Fort Lauderdale Public Works, telephone conversation with Greg Thomas, NUS Corporation, April 27, 1990. Subject: French drain storm drainage system.

15. William A. White, The Geomorphology of the Florida Peninsula, Geological Bulletin No. 51 (Tallahassee, Florida: Bureau of Geology, 1970).

16. H. Klein and J.E. Hull, Biscayne Aquifer, Southeast, Florida, Water-Resources Investigations 78-107 (Tallahassee, Florida: U.S. Geological Survey, 1978).

17. Willie Smitherman, NUS Corporation, interoffice memorandum to K.D. Pass, March 22, 1990. Subject: Municipal water systems for Broward County, Florida.

18. Carmen R. Causaras, Geology of the Surficial Aquifer System, Broward County, Florida, Water Resources Investigations Report 84-4068 (U.S. Geological Survey, 1985).

19. Garald G. Parker and others, Water Resources of Southeastern Florida, Water-Supply Paper No. 1255 (Washington, D.C.: GPO, 1955).

20. Melvin C. Schroeder, Howard Klein, and Nevin D. Hoy, Biscayne Aquifer of Dade and Broward Counties, Report of Investigations No. 17 (Tallahassee, Florida: U.S. Geological Survey, 1958).

21. Thomas M. Scott, The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida, Bulletin No. 59 (Tallahassee, Florida: Florida Geological Survey, 1988).

22. Richard H. Johnston and Peter W. Bush, Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama, U.S. Geological Survey Professional Paper 1403-A (Washington, D.C.: GPO, 1988).

23. James A. Miller, Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina, U.S. Geological Survey Professional Paper 1403-B (Washington, D.C.: GPO, 1986).

24. F.A.M. de Haan and P.J. Zwerman, "Pollution of the Soil", Soil Chemistry - A. Basic Elements, editors G.H. Bolt and M.G.M. Bruggenwert (Amsterdam, Netherlands: Elsevier Scientific Publishing Company, 1976).

25. George Sistare and Fredrick Disque, "Solders and Brazing Alloys", Kirk-Othmer Encyclopedia of Chemical Technology, 3rd ed., Vol. 21 (New York: John Wiley & Sons, 1983).

26. W.C. McNeill, "Chlorocarbons, Hydrocarbons (Trichloroethylene)," Kirk-Othmer Encyclopedia of Chemical Technology, 3rd ed., Vol. 5 (New York: John Wiley & Sons, 1979).

27. U.S. Environmental Protection Agency, Office of Drinking Water, Drinking Water Regulations and Health Advisories (Washington, D.C.: November 1990).

28. Glenn Adams, Groundwater Technology Unit, USEPA, Region IV, Atlanta, Georgia, telephone conversation with Joan Dupont, HALLIBURTON NUS Environmental Corporation, July 15, 1991. Subject: Federal drinking water standard for lead.

TABLE 3

FIELD MEASUREMENTS
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Sample Code	pH	Conductivity (umhos/cm)	Temp. (°F)
NV-MW-01	5.66	843	83.0
NV-MW-02	6.86	1002	89.5

unidentified compounds (20J ug/kg, total concentration). The preservative blank contained calcium (21,000 ug/l), iron (53 ug/l), lead (6 ug/l), magnesium (6,000 ug/l), potassium (3,000 ug/l), and sodium (39,000 ug/l). The complete analytical data sheets are presented in Appendix B.

4.2.3 Presentation of Analytical Results

This section presents a discussion and interpretation of the analytical results from the environmental samples collected during the investigation at Navtell. Results of soil and groundwater samples are presented in Tables 4, 5, 6, and 7. Control samples have been designated for all media. Values for control sample results are presented as either a measured value or as the MQL. Samples containing concentrations of contaminants greater than 3 times the control level or MQL of these contaminants are considered to be elevated. These samples are noted in the text.

Table 4 summarizes results of inorganic analysis of soil samples. Of all parameters analyzed, the only elevated result is lead in surface soil sample NV-SS-03, at 8.0 mg/kg, or 4 times greater than the control sample NV-SS-01. These results could be attributed to aeolian deposition of lead from vehicle exhaust, or conceivably to lead solder presumably used at Navtell (Refs. 24, pp. 232-233; 25, p. 344). This single marginally elevated result is not sufficient to conclusively demonstrate contamination or attribution.

Organic analytical results for soil samples are summarized in Table 5. No TCL compounds were detected at elevated concentrations in any of the environmental soil samples. Trichloroethene, detected at a low, nonelevated concentration (10J ug/kg) in surface soil sample NV-SS-03, is a commonly used degreaser for metal parts (Ref. 26, p. 745). Unidentified extractable compounds were reported in samples NV-SS-02, NV-SS-03, and NV-SB-03, at concentrations totaling 1000J to 5000J ug/kg.

Results of the inorganic analysis of water samples are summarized in Table 6. Comparing results from monitoring well sample NV-MW-02 to the control location at NV-MW-01, only arsenic is distinctly elevated, at 40 ug/l or 13 times the control. It is recognized that this well does not provide drinking water, but because groundwater is the sole source of drinking water in the area, the following results are compared with the Maximum Contaminant Levels (MCLs) established by the USEPA's Drinking Water Regulations. In sample NV-MW-02, chromium (at 55 ug/l, only twice the control) exceeds the primary MCL of 50 ug/l. (Effective July 1992, the MCL for chromium becomes 100 ug/l) (Ref. 27). Lead in NV-MW-02 (25 ug/l) exceeds the action level for public water supplies (15 ug/l) (Ref. 28).

Table 7 presents a summary of organic analytical results for groundwater samples. No elevated organic results were reported.

In summary, very few elevated results are reported, and they do not appear to be attributable to reported activities at this site.

APPENDIX A

OVERSIZED

DOCUMENT

APPENDIX 8

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Extractable Organic Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

JUN 3 [illegible]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Pesticide/PCB Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

JUN 3 1991

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Purgeable Organic Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

9102-04

JUN 3 1991

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56301 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: TB-01W COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA
SOURCE: NAVTELL
STATION ID: MW-02
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1435 STOP: 00/00/00
D. NUMBER: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: AM37 MD NO: AM37

ANALYTICAL RESULTS UG/L

10J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56301   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: TB-01W   COLLECTION START: 03/20/91 0700   STOP: 00/00/00

CASE NO.: 16059   SAS NO.:   D. NO.: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4-BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2 NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4-BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2-NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4-BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	20U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2 NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56301 SAMPLE TYPE: GROUNDWA
SOURCE: NAVTELL
STATION ID: TB-01W

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 0700 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
8U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56295   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: MW-01   COLLECTION START: 03/20/91 1630   STOP: 00/00/00

CASE NO.: 16059   SAS NO.:   D. NO.: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	2J	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
8U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS   ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
05/23/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00 **
**
** CASE NO.: 16059 SAS NO.: D. NO.: AM37 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	.5J	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	.5J	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-01
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1035 STOP: 00/00/00
D. NUMBER: AM30

UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC
18U	BETA-BHC
18U	DELTA-BHC
18U	GAMMA-BHC (LINDANE)
18U	HEPTACHLOR
18U	ALDRIN
18U	HEPTACHLOR EPOXIDE
18U	ENDOSULFAN I (ALPHA)
35U	DIELDRIN
35U	4,4'-DDE (P,P'-DDE)
35U	ENDRIN
35U	ENDOSULFAN II (BETA)
35U	4,4'-DDD (P,P'-DDD)
35U	ENDOSULFAN SULFATE
35U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
180U	METHOXYCHLOR
35U	ENDRIN KETONE
NA	ENDRIN ALDEHYDE
	CHLORDANE (TECH. MIXTURE) /1
180U	GAMMA-CHLORDANE /2
180U	ALPHA-CHLORDANE /2
350U	TOXAPHENE
180U	PCB-1016 (AROCLOR 1016)
180U	PCB-1221 (AROCLOR 1221)
180U	PCB-1232 (AROCLOR 1232)
180U	PCB-1242 (AROCLOR 1242)
180U	PCB-1248 (AROCLOR 1248)
350U	PCB-1254 (AROCLOR 1254)
350U	PCB-1260 (AROCLOR 1260)
9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-01
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1145 STOP: 00/00/00
D. NUMBER: AM31

UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC
18U	BETA-BHC
18U	DELTA-BHC
18U	GAMMA-BHC (LINDANE)
18U	HEPTACHLOR
18U	ALDRIN
18U	HEPTACHLOR EPOXIDE
18U	ENDOSULFAN I (ALPHA)
35U	DIELDRIN
35U	4,4'-DDE (P,P'-DDE)
35U	ENDRIN
35U	ENDOSULFAN II (BETA)
35U	4,4'-DDD (P,P'-DDD)
35U	ENDOSULFAN SULFATE
35U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
180U	METHOXYCHLOR
35U	ENDRIN KETONE
NA	ENDRIN ALDEHYDE
	CHLORDANE (TECH. MIXTURE) /1
180U	GAMMA-CHLORDANE /2
180U	ALPHA-CHLORDANE /2
350U	TOXAPHENE
180U	PCB-1016 (AROCLOR 1016)
180U	PCB-1221 (AROCLOR 1221)
180U	PCB-1232 (AROCLOR 1232)
180U	PCB-1242 (AROCLOR 1242)
180U	PCB-1248 (AROCLOR 1248)
350U	PCB-1254 (AROCLOR 1254)
350U	PCB-1260 (AROCLOR 1260)
9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-02
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1015 STOP: 00/00/00
D. NUMBER: AM32

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
9.9UR	ALPHA-BHC	99UR	METHOXYCHLOR
9.9UR	BETA-BHC	20UR	ENDRIN KETONE
9.9UR	DELTA-BHC	NA	ENDRIN ALDEHYDE
9.9UR	GAMMA-BHC (LINDANE)	--	CHLORDANE (TECH. MIXTURE) /1
9.9UR	HEPTACHLOR	61J	GAMMA-CHLORDANE /2
9.9UR	ALDRIN	45J	ALPHA-CHLORDANE /2
3.3J	HEPTACHLOR EPOXIDE	200UR	TOXAPHENE
9.9UR	ENDOSULFAN I (ALPHA)	99UR	PCB-1016 (AROCLOR 1016)
4.3J	DIELDRIN	99UR	PCB-1221 (AROCLOR 1221)
20UR	4,4'-DDE (P,P'-DDE)	99UR	PCB-1232 (AROCLOR 1232)
20UR	ENDRIN	99UR	PCB-1242 (AROCLOR 1242)
20UR	ENDOSULFAN II (BETA)	99UR	PCB-1248 (AROCLOR 1248)
20UR	4,4'-DDD (P,P'-DDD)	200UR	PCB-1254 (AROCLOR 1254)
20UR	ENDOSULFAN SULFATE	200UR	PCB-1260 (AROCLOR 1260)
8.6J	4,4'-DDT (P,P'-DDT)	19	PERCENT MOISTURE

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM33

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC	180U	METHOXYCHLOR
18U	BETA-BHC	36U	ENDRIN KETONE
18U	DELTA-BHC	NA	ENDRIN ALDEHYDE
18U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
18U	HEPTACHLOR	180U	GAMMA-CHLORDANE /2
18U	ALDRIN	180U	ALPHA-CHLORDANE /2
18U	HEPTACHLOR EPOXIDE	360U	TOXAPHENE
18U	ENDOSULFAN I (ALPHA)	180U	PCB-1016 (AROCLOR 1016)
36U	DIELDRIN	180U	PCB-1221 (AROCLOR 1221)
36U	4,4'-DDE (P,P'-DDE)	180U	PCB-1232 (AROCLOR 1232)
36U	ENDRIN	180U	PCB-1242 (AROCLOR 1242)
36U	ENDOSULFAN II (BETA)	180U	PCB-1248 (AROCLOR 1248)
36U	4,4'-DDD (P,P'-DDD)	360U	PCB-1254 (AROCLOR 1254)
36U	ENDOSULFAN SULFATE	360U	PCB-1260 (AROCLOR 1260)
36U	4,4'-DDT (P,P'-DDT)	12	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-03
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1330 STOP: 00/00/00
D. NUMBER: AM35

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
22U	ALPHA-BHC	220U	METHOXYCHLOR
22U	BETA-BHC	45U	ENDRIN KETONE
22U	DELTA-BHC	NA	ENDRIN ALDEHYDE
22U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
22U	HEPTACHLOR	220U	GAMMA-CHLORDANE /2
22U	ALDRIN	220U	ALPHA-CHLORDANE /2
22U	HEPTACHLOR EPOXIDE	450U	TOXAPHENE
22U	ENDOSULFAN I (ALPHA)	220U	PCB-1016 (AROCLOR 1016)
45U	DIELDRIN	220U	PCB-1221 (AROCLOR 1221)
45U	4,4'-DDE (P,P'-DDE)	220U	PCB-1232 (AROCLOR 1232)
45U	ENDRIN	220U	PCB-1242 (AROCLOR 1242)
45U	ENDOSULFAN II (BETA)	220U	PCB-1248 (AROCLOR 1248)
45U	4,4'-DDD (P,P'-DDD)	450U	PCB-1254 (AROCLOR 1254)
45U	ENDOSULFAN SULFATE	450U	PCB-1260 (AROCLOR 1260)
45U	4,4'-DDT (P,P'-DDT)	29	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-03 COLLECTION START: 03/20/91 1405 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM36

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
27U	ALPHA-BHC	270U	METHOXYCHLOR
27U	BETA-BHC	54U	ENDRIN KETONE
27U	DELTA-BHC	NA	ENDRIN ALDEHYDE
27U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
27U	HEPTACHLOR	270U	GAMMA-CHLORDANE /2
27U	ALDRIN	270U	ALPHA-CHLORDANE /2
27U	HEPTACHLOR EPOXIDE	540U	TOXAPHENE
27U	ENDOSULFAN I (ALPHA)	270U	PCB-1016 (AROCLOR 1016)
54U	DIELDRIN	270U	PCB-1221 (AROCLOR 1221)
54U	4,4'-DDE (P,P'-DDE)	270U	PCB-1232 (AROCLOR 1232)
54U	ENDRIN	270U	PCB-1242 (AROCLOR 1242)
54U	ENDOSULFAN II (BETA)	270U	PCB-1248 (AROCLOR 1248)
54U	4,4'-DDD (P,P'-DDD)	540U	PCB-1254 (AROCLOR 1254)
54U	ENDOSULFAN SULFATE	540U	PCB-1260 (AROCLOR 1260)
54U	4,4'-DDT (P,P'-DDT)	41	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL	PROG ELEM: NSF	COLLECTED BY: M COHEN
SOURCE: NAVTELL	CITY: FT LAUDERD	ST: FL
STATION ID: SS-02	COLLECTION START: 03/20/91 1015	STOP: 00/00/00
CASE NO.: 16059 SAS NO.:	D. NO.: AM32	MD NO: AM32

ANALYTICAL RESULTS UG/KG

4000J 10 UNIDENTIFIED COMPOUNDS

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-03
CASE NO.: 16059 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1330 STOP: 00/00/00
D. NO.: AM35 MD NO: AM35

ANALYTICAL RESULTS UG/KG

1000J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SB-03 COLLECTION START: 03/20/91 1405 STOP: 00/00/00 **
** CASE.NO.: 16059 SAS NO.: D. NO.: AM36 MD NO: AM36 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

5000J 4 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM30

UG/KG	ANALYTICAL RESULTS
730U	PHENOL
730U	BIS(2-CHLOROETHYL) ETHER
730U	2-CHLOROPHENOL
730U	1,3-DICHLOROBENZENE
730U	1,4-DICHLOROBENZENE
730U	1,2-DICHLOROBENZENE
730U	2-METHYLPHENOL
730U	2,2'-CHLOROISOPROPYLETHER
730U	(3-AND/OR 4-)METHYLPHENOL
730U	N-NITROSODI-N-PROPYLAMINE
730U	HEXACHLOROETHANE
730UR	NITROBENZENE
730U	ISOPHORONE
730U	2-NITROPHENOL
730U	2,4-DIMETHYLPHENOL
730U	BIS(2-CHLOROETHOXY) METHANE
730U	2,4-DICHLOROPHENOL
730U	1,2,4-TRICHLOROBENZENE
730UR	NAPHTHALENE
730U	4-CHLOROANILINE
730U	HEXACHLOROBUTADIENE
730U	4-CHLORO-3-METHYLPHENOL
730UR	2-METHYLNAPHTHALENE
730U	HEXACHLOROCYCLOPENTADIENE (HCCP)
730U	2,4,6-TRICHLOROPHENOL
3500U	2,4,5-TRICHLOROPHENOL
730U	2-CHLORONAPHTHALENE
3500U	2 NITROANILINE
730U	DIMETHYL PHTHALATE
730UJ	ACENAPHTHYLENE
730U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3500U	3-NITROANILINE
730U	ACENAPHTHENE
3500U	2,4-DINITROPHENOL
3500U	4-NITROPHENOL
730U	DIBENZOFURAN
730U	2,4-DINITROTOLUENE
730U	DIETHYL PHTHALATE
730U	4-CHLOROPHENYL PHENYL ETHER
730U	FLUORENE
3500U	4-NITROANILINE
3500U	2-METHYL-4,6-DINITROPHENOL
730U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
730U	4 BROMOPHENYL PHENYL ETHER
730U	HEXACHLOROBENZENE (HCB)
3500U	PENTACHLOROPHENOL
730U	PHENANTHRENE
730U	ANTHRACENE
NA	CARBAZOLE
730U	DI-N-BUTYLPHTHALATE
730U	FLUORANTHENE
730U	PYRENE
730U	BENZYL BUTYL PHTHALATE
1400U	3,3'-DICHLOROBENZIDINE
730U	BENZO(A)ANTHRACENE
730U	CHRYSENE
730U	BIS(2-ETHYLHEXYL) PHTHALATE
730U	DI-N-OCTYLPHTHALATE
730U	BENZO(B AND/OR K)FLUORANTHENE
730U	BENZO-A-PYRENE
730U	INDENO (1,2,3-CD) PYRENE
730U	DIBENZO(A,H)ANTHRACENE
730U	BENZO(GHI)PERYLENE
9	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-01 COLLECTION START: 03/20/91 1145 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM31

UG/KG	ANALYTICAL RESULTS
730U	PHENOL
730U	BIS(2-CHLOROETHYL) ETHER
730U	2-CHLOROPHENOL
730U	1,3-DICHLOROBENZENE
730U	1,4-DICHLOROBENZENE
730U	1,2-DICHLOROBENZENE
730U	2-METHYLPHENOL
730U	2,2'-CHLOROISOPROPYLETHER
730U	(3-AND/OR 4-)METHYLPHENOL
730U	N-NITROSODI-N-PROPYLAMINE
730U	HEXACHLOROETHANE
730UR	NITROBENZENE
730U	ISOPHORONE
730U	2-NITROPHENOL
730U	2,4-DIMETHYLPHENOL
730U	BIS(2-CHLOROETHOXY) METHANE
730U	2,4-DICHLOROPHENOL
730U	1,2,4-TRICHLOROBENZENE
730UR	NAPHTHALENE
730U	4-CHLOROANILINE
730U	HEXACHLOROBUTADIENE
730U	4-CHLORO-3-METHYLPHENOL
730UR	2-METHYLNAPHTHALENE
730U	HEXACHLOROCYCLOPENTADIENE (HCCP)
730U	2,4,6-TRICHLOROPHENOL
3600U	2,4,5-TRICHLOROPHENOL
730U	2-CHLORONAPHTHALENE
3600U	2 NITROANILINE
730U	DIMETHYL PHTHALATE
730UJ	ACENAPHTHYLENE
730U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3600U	3-NITROANILINE
730U	ACENAPHTHENE
3600U	2,4-DINITROPHENOL
3600U	4-NITROPHENOL
730U	DIBENZOFURAN
730U	2,4-DINITROTOLUENE
730U	DIETHYL PHTHALATE
730U	4-CHLOROPHENYL PHENYL ETHER
730U	FLUORENE
3600U	4-NITROANILINE
3600U	2-METHYL-4,6-DINITROPHENOL
730U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
730U	4 BROMOPHENYL PHENYL ETHER
730U	HEXACHLOROBENZENE (HCB)
3600U	PENTACHLOROPHENOL
730U	PHENANTHRENE
730U	ANTHRACENE
NA	CARBAZOLE
730U	DI-N-BUTYLPHTHALATE
730U	FLUORANTHENE
730U	PYRENE
730U	BENZYL BUTYL PHTHALATE
1400U	3,3'-DICHLOROBENZIDINE
730U	BENZO(A)ANTHRACENE
730U	CHRYSENE
730U	BIS(2-ETHYLHEXYL) PHTHALATE
730U	DI-N-OCTYLPHTHALATE
730U	BENZO(B AND/OR K)FLUORANTHENE
730U	BENZO-A-PYRENE
730U	INDENO (1,2,3-CD) PYRENE
730U	DIBENZO(A,H)ANTHRACENE
730U	BENZO(GHI)PERYLENE
9	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-02 COLLECTION START: 03/20/91 1015 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM32

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
410UR	PHENOL	2000UR	3-NITROANILINE
410UR	BIS(2-CHLOROETHYL) ETHER	410UR	ACENAPHTHENE
410UR	2-CHLOROPHENOL	2000UR	2,4-DINITROPHENOL
410UR	1,3-DICHLOROBENZENE	2000UR	4-NITROPHENOL
410UR	1,4-DICHLOROBENZENE	410UR	DIBENZOFURAN
410UR	1,2-DICHLOROBENZENE	410UR	2,4-DINITROTOLUENE
410UR	2-METHYLPHENOL	410UR	DIETHYL PHTHALATE
410UR	2,2'-CHLOROISOPROPYLETHER	410UR	4-CHLOROPHENYL PHENYL ETHER
410UR	(3-AND/OR 4-)METHYLPHENOL	410UR	FLUORENE
410UR	N-NITROSODI-N-PROPYLAMINE	2000UR	4-NITROANILINE
410UR	HEXACHLOROETHANE	2000UR	2-METHYL-4,6-DINITROPHENOL
410UR	NITROBENZENE	410UR	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
410UR	ISOPHORONE	410UR	4 BROMOPHENYL PHENYL ETHER
410UR	2-NITROPHENOL	410UR	HEXACHLOROBENZENE (HCB)
410UR	2,4-DIMETHYLPHENOL	2000UR	PENTACHLOROPHENOL
410UR	BIS(2-CHLOROETHOXY) METHANE	410UR	PHENANTHRENE
410UR	2,4-DICHLOROPHENOL	410UR	ANTHRACENE
410UR	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
410UR	NAPHTHALENE	700UR	DI-N-BUTYLPHTHALATE
410UR	4-CHLOROANILINE	410UR	FLUORANTHENE
410UR	HEXACHLOROBUTADIENE	410UR	PYRENE
410UR	4-CHLORO-3-METHYLPHENOL	410UR	BENZYL BUTYL PHTHALATE
410UR	2-METHYLNAPHTHALENE	820UR	3,3'-DICHLOROBENZIDINE
410UR	HEXACHLOROCYCLOPENTADIENE (HCCP)	410UR	BENZO(A)ANTHRACENE
410UR	2,4,6-TRICHLOROPHENOL	410UR	CHRYSENE
2000UR	2,4,5-TRICHLOROPHENOL	410UR	BIS(2-ETHYLHEXYL) PHTHALATE
410UR	2-CHLORONAPHTHALENE	410UR	DI-N-OCTYLPHTHALATE
2000UR	2 NITROANILINE	410UR	BENZO(B AND/OR K)FLUORANTHENE
410UR	DIMETHYL PHTHALATE	410UR	BENZO-A-PYRENE
410UR	ACENAPHTHYLENE	410UR	INDENO (1,2,3-CD) PYRENE
410UR	2,6-DINITROTOLUENE	410UR	DIBENZO(A,H)ANTHRACENE
		410UR	BENZO(GHI)PERYLENE
		19	PERCENT MOISTURE

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM33

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
760U	PHENOL	3700U	3-NITROANILINE
760U	BIS(2-CHLOROETHYL) ETHER	760U	ACENAPHTHENE
760U	2-CHLOROPHENOL	3700U	2,4-DINITROPHENOL
760U	1,3-DICHLOROBENZENE	3700U	4-NITROPHENOL
760U	1,4-DICHLOROBENZENE	760U	DIBENZOFURAN
760U	1,2-DICHLOROBENZENE	760U	2,4-DINITROTOLUENE
760U	2-METHYLPHENOL	760U	DIETHYL PHTHALATE
760U	2,2'-CHLOROISOPROPYLETHER	760U	4-CHLOROPHENYL PHENYL ETHER
760U	(3-AND/OR 4-)METHYLPHENOL	760U	FLUORENE
760U	N-NITROSODI-N-PROPYLAMINE	3700U	4-NITROANILINE
760U	HEXACHLOROETHANE	3700U	2-METHYL-4,6-DINITROPHENOL
760UR	NITROBENZENE	760U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
760U	ISOPHORONE	760U	4 BROMOPHENYL PHENYL ETHER
760U	2-NITROPHENOL	760U	HEXACHLOROBENZENE (HCB)
760U	2,4-DIMETHYLPHENOL	3700U	PENTACHLOROPHENOL
760U	BIS(2-CHLOROETHOXY) METHANE	760U	PHENANTHRENE
760U	2,4-DICHLOROPHENOL	760U	ANTHRACENE
760U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
760UR	NAPHTHALENE	760U	DI-N-BUTYLPHTHALATE
760U	4-CHLOROANILINE	760U	FLUORANTHENE
760U	HEXACHLOROBUTADIENE	760U	PYRENE
760U	4-CHLORO-3-METHYLPHENOL	760U	BENZYL BUTYL PHTHALATE
760UR	2-METHYLNAPHTHALENE	1500U	3,3'-DICHLOROBENZIDINE
760U	HEXACHLOROCYCLOPENTADIENE (HCCP)	760U	BENZO(A)ANTHRACENE
760U	2,4,6-TRICHLOROPHENOL	760U	CHRYSENE
3700U	2,4,5-TRICHLOROPHENOL	760U	BIS(2-ETHYLHEXYL) PHTHALATE
760U	2-CHLORONAPHTHALENE	760U	DI-N-OCTYLPHTHALATE
3700U	2 NITROANILINE	760U	BENZO(B AND/OR K)FLUORANTHENE
760U	DIMETHYL PHTHALATE	760U	BENZO-A-PYRENE
760UJ	ACENAPHTHYLENE	760U	INDENO (1,2,3-CD) PYRENE
760U	2,6-DINITROTOLUENE	760U	DIBENZO(A,H)ANTHRACENE
		760U	BENZO(GHI)PERYLENE
		12	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM35

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
930U	PHENOL	4500U	3-NITROANILINE
930U	BIS(2-CHLOROETHYL) ETHER	930U	ACENAPHTHENE
930U	2-CHLOROPHENOL	4500U	2,4-DINITROPHENOL
930U	1,3-DICHLOROBENZENE	4500U	4-NITROPHENOL
930U	1,4-DICHLOROBENZENE	930U	DIBENZOFURAN
930U	1,2-DICHLOROBENZENE	930U	2,4-DINITROTOLUENE
930U	2-METHYLPHENOL	930U	DIETHYL PHTHALATE
930U	2,2'-CHLOROISOPROPYLETHER	930U	4-CHLOROPHENYL PHENYL ETHER
930U	(3-AND/OR 4-)METHYLPHENOL	930U	FLUORENE
930U	N-NITROSODI-N-PROPYLAMINE	4500U	4-NITROANILINE
930U	HEXACHLOROETHANE	4500U	2-METHYL-4,6-DINITROPHENOL
930UR	NITROBENZENE	930U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
930U	ISOPHORONE	930U	4-BROMOPHENYL PHENYL ETHER
930U	2-NITROPHENOL	930U	HEXACHLOROBENZENE (HCB)
930U	2,4-DIMETHYLPHENOL	4500U	PENTACHLOROPHENOL
930U	BIS(2-CHLOROETHOXY) METHANE	930U	PHENANTHRENE
930U	2,4-DICHLOROPHENOL	930U	ANTHRACENE
930U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
930UR	NAPHTHALENE	930U	DI-N-BUTYLPHTHALATE
930U	4-CHLOROANILINE	930U	FLUORANTHENE
930U	HEXACHLOROBUTADIENE	930U	PYRENE
930U	4-CHLORO-3-METHYLPHENOL	930U	BENZYL BUTYL PHTHALATE
930UR	2-METHYLNAPHTHALENE	1800U	3,3'-DICHLOROBENZIDINE
930U	HEXACHLOROCYCLOPENTADIENE (HCCP)	930U	BENZO(A)ANTHRACENE
930U	2,4,6-TRICHLOROPHENOL	930U	CHRYSENE
4500U	2,4,5-TRICHLOROPHENOL	930U	BIS(2-ETHYLHEXYL) PHTHALATE
930U	2-CHLORONAPHTHALENE	930U	DI-N-OCTYLPHTHALATE
4500U	2-NITROANILINE	930U	BENZO(B AND/OR K)FLUORANTHENE
930U	DIMETHYL PHTHALATE	930U	BENZO-A-PYRENE
930UJ	ACENAPHTHYLENE	930U	INDENO (1,2,3-CD) PYRENE
930U	2,6-DINITROTOLUENE	930U	DIBENZO(A,H)ANTHRACENE
		930U	BENZO(GHI)PERYLENE
		29	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-03

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1405 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM36

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
1100U	PHENOL	5500U	3-NITROANILINE
1100U	BIS(2-CHLOROETHYL) ETHER	1100U	ACENAPHTHENE
1100U	2-CHLOROPHENOL	5500U	2,4-DINITROPHENOL
1100U	1,3-DICHLOROBENZENE	5500U	4-NITROPHENOL
1100U	1,4-DICHLOROBENZENE	1100U	DIBENZOFURAN
1100U	1,2-DICHLOROBENZENE	1100U	2,4-DINITROTOLUENE
1100U	2-METHYLPHENOL	1100U	DIETHYL PHTHALATE
1100U	2,2'-CHLOROISOPROPYLETHER	1100U	4-CHLOROPHENYL PHENYL ETHER
1100U	(3-AND/OR 4-)METHYLPHENOL	1100U	FLUORENE
1100U	N-NITROSODI-N-PROPYLAMINE	5500U	4-NITROANILINE
1100U	HEXACHLOROETHANE	5500U	2-METHYL-4,6-DINITROPHENOL
1100UR	NITROBENZENE	1100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1100U	ISOPHORONE	1100U	4-BROMOPHENYL PHENYL ETHER
1100U	2-NITROPHENOL	1100U	HEXACHLOROBENZENE (HCB)
1100U	2,4-DIMETHYLPHENOL	5500U	PENTACHLOROPHENOL
1100U	BIS(2-CHLOROETHOXY) METHANE	1100U	PHENANTHRENE
1100U	2,4-DICHLOROPHENOL	1100U	ANTHRACENE
1100U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
1100UR	NAPHTHALENE	1100U	DI-N-BUTYLPHTHALATE
1100U	4-CHLOROANILINE	1100U	FLUORANTHENE
1100U	HEXACHLOROBUTADIENE	1100U	PYRENE
1100U	4-CHLORO-3-METHYLPHENOL	1100U	BENZYL BUTYL PHTHALATE
1100UR	2-METHYLNAPHTHALENE	2200U	3,3'-DICHLOROBENZIDINE
1100U	HEXACHLOROCYCLOPENTADIENE (HCCP)	1100U	BENZO(A)ANTHRACENE
1100U	2,4,6-TRICHLOROPHENOL	1100U	CHRYSENE
5500U	2,4,5-TRICHLOROPHENOL	1100U	BIS(2-ETHYLHEXYL) PHTHALATE
1100U	2-CHLORONAPHTHALENE	1100U	DI-N-OCTYLPHTHALATE
5500U	2-NITROANILINE	1100U	BENZO(B AND/OR K)FLUORANTHENE
1100U	DIMETHYL PHTHALATE	1100U	BENZO-A-PYRENE
1100UJ	ACENAPHTHYLENE	1100U	INDENO (1,2,3-CD) PYRENE
1100U	2,6-DINITROTOLUENE	1100U	DIBENZO(A,H)ANTHRACENE
		1100U	BENZO(GHI)PERYLENE
		41	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56302 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL	CITY: FT LAUDERD ST: FL
STATION ID: TB-01S	COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.:	D. NO.: AM28 MD NO:

ANALYTICAL RESULTS UG/KG

20J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00 **
** CASE.NO.: 16059 SAS NO.: D. NO.: AM30 MD NO: AM30 **
** **
*** ***

ANALYTICAL RESULTS UG/KG

10J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-01
CASE.NO.: 16059 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1145 STOP: 00/00/00
D. NO.: AM31 MD NO: AM31

ANALYTICAL RESULTS UG/KG

6JN BIS(DIMETHYLETHYL)CYCLOHEXADIENEDIONE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56302 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: TB-01S COLLECTION START: 03/20/91 0700 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM28

UG/KG	ANALYTICAL RESULTS
10U	CHLOROMETHANE
10U	BROMOMETHANE
10U	VINYL CHLORIDE
10U	CHLOROETHANE
20U	METHYLENE CHLORIDE
590J	ACETONE
5U	CARBON DISULFIDE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
5U	1,1-DICHLOROETHANE
5U	1,2-DICHLOROETHENE (TOTAL)
5U	CHLOROFORM
5U	1,2-DICHLOROETHANE
10U	METHYL ETHYL KETONE
5U	1,1,1-TRICHLOROETHANE
5U	CARBON TETRACHLORIDE
5U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
5U	1,2-DICHLOROPROPANE
5U	CIS-1,3-DICHLOROPROPENE
5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
5U	DIBROMOCHLOROMETHANE
5U	1,1,2-TRICHLOROETHANE
5U	BENZENE
5U	TRANS-1,3-DICHLOROPROPENE
5U	BROMOFORM
10U	METHYL ISOBUTYL KETONE
10U	METHYL BUTYL KETONE
5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,1,2,2-TETRACHLOROETHANE
5U	TOLUENE
5U	CHLOROBENZENE
5U	ETHYL BENZENE
5U	STYRENE
5U	TOTAL XYLENES
8	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-01

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1035 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM30

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
9U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
9U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
9U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
9U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
9U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	9U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	9U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
9U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES
		9	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-01 COLLECTION START: 03/20/91 1145 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM31

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
40U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES
		9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-02

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1015 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM32

UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE
12U	BROMOMETHANE
12U	VINYL CHLORIDE
12U	CHLOROETHANE
30U	METHYLENE CHLORIDE
20U	ACETONE
6U	CARBON DISULFIDE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
6U	1,1-DICHLOROETHANE
6U	1,2-DICHLOROETHENE (TOTAL)
6U	CHLOROFORM
6U	1,2-DICHLOROETHANE
12U	METHYL ETHYL KETONE
6U	1,1,1-TRICHLOROETHANE
6U	CARBON TETRACHLORIDE
6U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
6U	1,2-DICHLOROPROPANE
6U	CIS-1,3-DICHLOROPROPENE
6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
6U	DIBROMOCHLOROMETHANE
6U	1,1,2-TRICHLOROETHANE
6U	BENZENE
6U	TRANS-1,3-DICHLOROPROPENE
6U	BROMOFORM
12U	METHYL ISOBUTYL KETONE
12U	METHYL BUTYL KETONE
6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,1,2,2-TETRACHLOROETHANE
6U	TOLUENE
6U	CHLOROBENZENE
6U	ETHYL BENZENE
6U	STYRENE
6U	TOTAL XYLENES
19	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM33

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
40U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES
		12	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM35

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE	7UJ	1,2-DICHLOROPROPANE
13U	BROMOMETHANE	7UJ	CIS-1,3-DICHLOROPROPENE
13U	VINYL CHLORIDE	10J	TRICHLOROETHENE(TRICHLOROETHYLENE)
13U	CHLOROETHANE	7UJ	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	7UJ	1,1,2-TRICHLOROETHANE
13U	ACETONE	7UJ	BENZENE
7U	CARBON DISULFIDE	7UJ	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7UJ	BROMOFORM
7U	1,1-DICHLOROETHANE	13UJ	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	13UJ	METHYL BUTYL KETONE
7U	CHLOROFORM	7UJ	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7UJ	1,1,2,2-TETRACHLOROETHANE
13U	METHYL ETHYL KETONE	7UJ	TOLUENE
7UJ	1,1,1-TRICHLOROETHANE	7UJ	CHLOROBENZENE
7UJ	CARBON TETRACHLORIDE	7UJ	ETHYL BENZENE
7UJ	BROMODICHLOROMETHANE	7UJ	STYRENE
		7UJ	TOTAL XYLENES
		29	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-03

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1405 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM36

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
15U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
15U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
15U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
20U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	15U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	15U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
15U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
7U	BROMODICHLOROMETHANE	7U	STYRENE
		7U	TOTAL XYLENES
		41	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

ANALYTICAL DATA TRACKING SHEETS

SITE NAME: Nautell
LOCATION: Ft. Lauderdale, Broward County FL
DATE SAMPLED: 5/20/91

TDD NO.: F4-9102-04
PROJECT NO.:
CASE NO.: 16059
DATA SET COMPLETED:

Soil/Sediment Samples

Station	Cyanide	Metals	Purge-able	Purge-able Misc.	Extract-able	Extract-able Misc.	Pesti-cides/ PCBs	Remarks
NV-TB-01S								
NV-SS-01	5-20-91	5-20-91						
NV-SB-01								
NV-SS-02								
NV-SB-02								
NV-SS-03								
NV-SB-03								

Water Samples

Station	Cyanide	Metals	Purge-able	Purge-able Misc.	Extract-able	Extract-able Misc.	Pesti-cides/ PCBs	Remarks
NV-TB-01W								
NV-PB-01	5-20-91	5-20-91						
NV-MW-01								
NV-MW-02								

PROJECT MANAGER
M. Cohen

INORGANIC DATA QUALIFIERS REPORT

Case Number: 16059
Project Number: 91-369
Site: Navtell, Ft. Lauderdale, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in Blanks
Al	J	All positives	Matrix spike recovery - 133%
Hg	J R	All positives All negatives	Matrix spike recovery - 170% Blind spike recovery - 0%
Se	J	All	Matrix spike recovery - 30.1% Calibration curve r <.995
B. Soil			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Ni, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in blanks
Hg	J R	All positives All negatives	Matrix spike recovery - 155.8% Blind spike recovery - 0%
Se	J	All	Calibration curve r <.995

INORGANIC DATA QUALIFIERS REPORT

Case Number: 16059
Project Number: 91-369
Site: Navtell, Ft. Lauderdale, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in Blanks
Al	J	All positives	Matrix spike recovery = 133%
Hg	J	All positives	Matrix spike recovery = 170%
	R	All negatives	Blind spike recovery = 0%
Se	J	All	Matrix spike recovery = 30.1% Calibration curve r <.995
B. Soil			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Ni, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in blanks
Hg	J	All positives	Matrix spike recovery = 155.8%
	R	All negatives	Blind spike recovery = 0%
Se	J	All	Calibration curve r <.995

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/11/91

SUBJECT: Results of Specified Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight Gary Bennett /for
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

RECEIVED
MAY 20 1991
NUS CORPORATION
REGION IV
SENT TO ________

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/11/91

SUBJECT: Results of Metals Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight, /for
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

04-9102-04
S Bonnard

RECEIVED
MAY 20 1991
NUS CORPORATION
REGION IV
SENT TO

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
5900J	ALUMINUM	30	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
3U	ARSENIC	9U	NICKEL
120	BARIUM	3600	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
11	CADMIUM	3U	SILVER
2100000	CALCIUM	41000	SODIUM
26	CHROMIUM	2UJ	THALLIUM
3U	COBALT	NA	TIN
6U	COPPER	19	VANADIUM
5800	IRON	40U	ZINC
13	LEAD		
6000	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
17000J	ALUMINUM	83	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
40	ARSENIC	10	NICKEL
150	BARIUM	6400	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
2U	CADMIUM	3U	SILVER
2200000	CALCIUM	53000	SODIUM
55	CHROMIUM	2UJ	THALLIUM
5U	COBALT	NA	TIN
20U	COPPER	26	VANADIUM
16000	IRON	60U	ZINC
25	LEAD		
7800	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56288 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: PB-01 COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
130UJ	ALUMINUM	8U	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
2U	ARSENIC	5U	NICKEL
4U	BARIUM	3000	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
2U	CADMIUM	3U	SILVER
21000	CALCIUM	39000	SODIUM
5U	CHROMIUM	2UJ	THALLIUM
3U	COBALT	NA	TIN
2U	COPPER	3U	VANADIUM
53	IRON	6U	ZINC
6	LEAD		
6000	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SPECIFIED ANALYSIS DATA REPORT

```
** PROJECT NO. 91-369   SAMPLE NO. 56295  SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M COHEN          **
** SOURCE: NAVTELL                                                CITY: FT LAUDERD          ST: FL                 **
** STATION ID: MW-01                                              COLLECTION START: 03/20/91  1630  STOP: 00/00/00 **
** CASE.NO.: 16059          SAS NO.:                              D. NO.: AM34              MD NO: AM34            **
```

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: AM37 MD NO: AM37

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369   SAMPLE NO. 56288  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M COHEN              **
**   SOURCE: NAVTELL                                                 CITY: FT LAUDERD            ST: FL                     **
**   STATION ID: PB-01                                               COLLECTION START: 03/20/91  0700   STOP: 00/00/00     **
**   CASE.NO.: 16059          SAS NO.:                               D. NO.:                     MD NO: AM29                **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-01 COLLECTION START: 03/20/91 1145 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM31

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1200	ALUMINUM	3.2	MANGANESE
2.6U	ANTIMONY	0.09UR	MERCURY
1U	ARSENIC	2U	NICKEL
3.1	BARIUM	30U	POTASSIUM
0.21U	BERYLLIUM	0.64UJ	SELENIUM
0.43U	CADMIUM	0.64U	SILVER
66000	CALCIUM	130U	SODIUM
4.2	CHROMIUM	0.43U	THALLIUM
0.64U	COBALT	NA	TIN
1U	COPPER	1.9	VANADIUM
660	IRON	4U	ZINC
2.4	LEAD	09	PERCENT MOISTURE
240	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM33

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1400	ALUMINUM	8.4	MANGANESE
2.7U	ANTIMONY	0.10UR	MERCURY
0.45U	ARSENIC	2U	NICKEL
6.4	BARIUM	28U	POTASSIUM
0.23U	BERYLLIUM	0.67UJ	SELENIUM
0.45U	CADMIUM	0.68U	SILVER
140000	CALCIUM	280U	SODIUM
4.6	CHROMIUM	0.45U	THALLIUM
2U	COBALT	NA	TIN
2U	COPPER	2.5	VANADIUM
800	IRON	9U	ZINC
3.5	LEAD	12	PERCENT MOISTURE
580	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-03 COLLECTION START: 03/20/91 1405 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM36

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1800	ALUMINUM	4.7	MANGANESE
2.6U	ANTIMONY	0.09UR	MERCURY
0.45U	ARSENIC	1.1U	NICKEL
4.2	BARIUM	62	POTASSIUM
0.22U	BERYLLIUM	0.68UJ	SELENIUM
0.44U	CADMIUM	0.65U	SILVER
70000	CALCIUM	140U	SODIUM
5.2	CHROMIUM	0.45U	THALLIUM
0.65U	COBALT	NA	TIN
0.44U	COPPER	2.3	VANADIUM
1000	IRON	5U	ZINC
3.3	LEAD	12	PERCENT MOISTURE
250	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM30

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1400	ALUMINUM	11	MANGANESE
2.6U	ANTIMONY	0.11UR	MERCURY
1U	ARSENIC	2U	NICKEL
7.2	BARIUM	57	POTASSIUM
0.22U	BERYLLIUM	0.65UJ	SELENIUM
0.43U	CADMIUM	0.65U	SILVER
150000	CALCIUM	350U	SODIUM
3.9	CHROMIUM	0.43U	THALLIUM
0.65U	COBALT	NA	TIN
2U	COPPER	4.9	VANADIUM
780	IRON	5U	ZINC
2	LEAD	11	PERCENT MOISTURE
700	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-02
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1015 STOP: 00/00/00
MD NUMBER: AM32

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1700	ALUMINUM	11	MANGANESE
3U	ANTIMONY	0.13UR	MERCURY
2U	ARSENIC	1.2U	NICKEL
11	BARIUM	79	POTASSIUM
0.25U	BERYLLIUM	0.72UJ	SELENIUM
0.50U	CADMIUM	0.74U	SILVER
75000	CALCIUM	180U	SODIUM
7.6	CHROMIUM	0.48U	THALLIUM
0.74U	COBALT	NA	TIN
4U	COPPER	2.3	VANADIUM
390	IRON	10U	ZINC
3.9	LEAD	20	PERCENT MOISTURE
250	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56293   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: SS-03   COLLECTION START: 03/20/91 1330   STOP: 00/00/00
CASE NUMBER: 16059   SAS NUMBER: MD NUMBER: AM35

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1200	ALUMINUM	18	MANGANESE
3.3U	ANTIMONY	0.14UR	MERCURY
2U	ARSENIC	1.4U	NICKEL
8.8	BARIUM	70	POTASSIUM
0.27U	BERYLLIUM	1UJ	SELENIUM
0.55U	CADMIUM	0.82U	SILVER
86000	CALCIUM	210U	SODIUM
3.2	CHROMIUM	0.58U	THALLIUM
2U	COBALT	NA	TIN
7U	COPPER	2.7	VANADIUM
1800	IRON	20U	ZINC
8.9	LEAD	30	PERCENT MOISTURE
420	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56290   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: SB-01   COLLECTION START: 03/20/91 1145   STOP: 00/00/00
CASE.NO.: 16059   SAS NO.:   D. NO.: AM31   MD NO: AM31

RESULTS	UNITS	PARAMETER
4.8U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369   SAMPLE NO. 56292  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                 **
**   SOURCE: NAVTELL                                                 CITY: FT LAUDERD             ST: FL                    **
**   STATION ID: SB-02                                               COLLECTION START: 03/20/91  1255   STOP: 00/00/00      **
**   CASE NO.: 16059         SAS NO.:                                D. NO.: AM33                 MD NO: AM33               **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
5.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-03
CASE.NO.: 16059 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1405 STOP: 00/00/00
D. NO.: AM36 MD NO: AM36

RESULTS	UNITS	PARAMETER
5.6U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL
CITY: FT LAUDERD ST: FL
STATION ID: SS-01
COLLECTION START: 03/20/91 1035 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.:
D. NO.: AM30 MD NO: AM30

RESULTS	UNITS	PARAMETER
5.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56291  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                    **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD             ST: FL                       **
**   STATION ID: SS-02                                                COLLECTION START: 03/20/91  1015   STOP: 00/00/00         **
**   CASE.NO.: 16059          SAS NO.:                                D. NO.: AM32                MD NO: AM32                   **
**                                                                                                                              **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
5.9U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: AM35 MD NO: AM35

RESULTS	UNITS	PARAMETER
6.9U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

APPENDIX C

Site Inspection Report

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	FLD118624188

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
NAUTELL	3331 N.W. 55th Street

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Fort Lauderdale	FL		Broward		

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
26 11 27.	080 11 39.	☐ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION (MONTH DAY YEAR)	02 SITE STATUS	03 YEARS OF OPERATION
03 20 91	☐ ACTIVE ☒ INACTIVE	prior 1984 (BEGINNING YEAR), 1985 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ________ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ________ (Name of firm)

☐ E. STATE ☐ F. STATE CONTRACTOR ________ (Name of firm) ☐ G. OTHER ________ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO
Mitch Cohen	Project Manager	NUS	(404) 938 7710

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO
Eric Tschudi			( )
Terry Sawyer			( )
Stephany Fine			( )
Matt McCoy			( )
Jay Chastain			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Ken Karaczewski			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT		

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO
Tillman McAdams	U.S. EPA, Region IV (ATLANTA)	(404) 3475065

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE (MONTH DAY YEAR)
Keith Hazen		Halliburton NUS	404 9387710	8 25 91

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ✓ A. SOLID
- B. POWDER, FINES
- C. SLUDGE
- D. OTHER ______ (Specify)
- E. SLURRY
- ✓ F. LIQUID
- G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS ______

CUBIC YARDS Unknown

NO. OF DRUMS ______

03 WASTE CHARACTERISTICS (Check all that apply)

- A. TOXIC
- B. CORROSIVE
- C. RADIOACTIVE
- D. PERSISTENT
- E. SOLUBLE
- F. INFECTIOUS
- G. FLAMMABLE
- H. IGNITABLE
- I. HIGHLY VOLATILE
- J. EXPLOSIVE
- K. REACTIVE
- L. INCOMPATIBLE
- M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS	unknown		
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	Unknown		

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
MES	Lead	7439-92-1	unknown	25	ug/l
MES	Arsenic	7440-38-2	unknown	40	ug/l
MES	Chromium	7440-47-3	unknown	55 ug/l	ug/l
SOL	Trichloroethene	142-28-9	Drums	10.5 ug/kg	ug/l

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA, STATE & NUS FILES

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FL0118624188

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: 3/20/91) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 152,250 connections
04 NARRATIVE DESCRIPTION

FIT IV Detected Arsenic, chromium, and Lead at elevated levels

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

facility is paved. Direct contact is unlikely

undocumented

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: ______ (Acres)
04 NARRATIVE DESCRIPTION

Some metals were detected, however, there is little chance of exposure to the general public

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

Groundwater samples contained concentrations of arsenic, chromium and lead. The Biscayne aquifer is a sole source aquifer.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ______) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______
04 NARRATIVE DESCRIPTION

undocumented

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	FLD118629188

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include name(s) of species)

undocumented

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ______ 04 NARRATIVE DESCRIPTION

undocumented

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

undocumented

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

undocumented

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None

III. TOTAL POPULATION POTENTIALLY AFFECTED: ______

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA, STATE, AND NUS FILES

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	FL0119624188

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
✓ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☒ C. DRUMS, ABOVE GROUND	unknown	
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

☐ A. INCENERATION
☐ B. UNDERGROUND INJECTION
☐ C. CHEMICAL/PHYSICAL
☐ D. BIOLOGICAL
☐ E. WASTE OIL PROCESSING
☐ F. SOLVENT RECOVERY
☐ G. OTHER RECYCLING/RECOVERY
☐ H. OTHER (Specify)

05 OTHER

✓ A. BUILDINGS ON SITE

06 AREA OF SITE

approximately one Acres

07 COMMENTS

The spent solvents were placed in small containers until retrieved by municipal trash collectors.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

✓ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Description of waste containers are described as small containers. Specific information on these waste containers are not supplied in the file material.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☐ NO

02 COMMENTS

unknown

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

EPA, STATE, AND NUS FILES

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A ☐	B ☑
NON-COMMUNITY	C ☐	D ☑

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A ☑	B ☐	C ☐
D ☐	E ☐	F ☐

03 DISTANCE TO SITE

A. 100 feet (mi)
B. ______ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☑ A. ONLY SOURCE FOR DRINKING ☑ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 152,250 connections

03 DISTANCE TO NEAREST DRINKING WATER WELL 100 feet (mi)

04 DEPTH TO GROUNDWATER 80-100 (ft)

05 DIRECTION OF GROUNDWATER FLOW North

06 DEPTH TO AQUIFER OF CONCERN 80-120 (ft)

07 POTENTIAL YIELD OF AQUIFER ______ (gpd)

08 SOLE SOURCE AQUIFER ☑ YES ☐ NO

09 DESCRIPTION OF WELLS (including usage, depth, and location relative to population and buildings)

Municipal wellfields within a 4-mile radius of the facility serve approximately 152,250 connections. Services the commercial/industrial and residential areas from the sole source aquifer

10 RECHARGE AREA ☑ YES ☐ NO COMMENTS

11 DISCHARGE AREA ☐ YES ☐ NO COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☑ A. RESERVOIR, RECREATION ~~DRINKING WATER SOURCE~~ ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
	☐	(mi)
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE A. 1938 NO. OF PERSONS
TWO (2) MILES OF SITE B. 32907 NO. OF PERSONS
THREE (3) MILES OF SITE C. 55165 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 0.4 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE ______

04 DISTANCE TO NEAREST OFF-SITE BUILDING 0.1 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

This area is a densely populated commercial/residential/industrial area. It remains the same throughout the 4 mile radNs.

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: FL
02 SITE NUMBER: FLD118624188

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. 10^{-6} – 10^{-8} cm/sec ☐ B. 10^{-4} – 10^{-6} cm/sec ☑ C. 10^{-4} – 10^{-3} cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE (10^{-4} – 10^{-6} cm/sec) ☐ C. RELATIVELY PERMEABLE (10^{-2} – 10^{-4} cm/sec) ☑ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK: Unknown (ft)
04 DEPTH OF CONTAMINATED SOIL ZONE: Unknown (ft)
05 SOIL pH: Unknown

06 NET PRECIPITATION: ______ (in)
07 ~~ONE~~ TWO YEAR 24 HOUR RAINFALL: 5.8 (in)
08 SLOPE — SITE SLOPE: <1 % — DIRECTION OF SITE SLOPE: No prevalent direction — TERRAIN AVERAGE SLOPE: <1 %

09 FLOOD POTENTIAL: SITE IS IN Unknown YEAR FLOODPLAIN
10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE: A. >4 (mi) OTHER: B. 2.2 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species): ______ (mi)
ENDANGERED SPECIES: Unknown

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS, NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. <0.1 (mi)	B. 0.4 (mi)	C. >4.0 (mi)	D. >4.0 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The Navtell facility is located in a mixed commercial/industrial/residential land use area. The surrounding topography is relatively flat lying with no pronounced slope. A system of canals exist in the Fort Lauderdale area, however, no surface runoff from the facility is connected to the canal systems. Wetland areas exist in several areas, the closest being 1.6 miles north of Navtell.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA, STATE, & NUS FILES

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	3	National Envir. Test of Bartlett, IL.	
SURFACE WATER	0	and (organic)	
WASTE		Skinner & Sherman of Waltham, Mass.	
AIR		(inorganic)	
RUNOFF			
SPILL			
SOIL	6		
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
groundwater	pH, temperature, and conductivity.

IV. PHOTOGRAPHS AND MAPS

01 TYPE X GROUND ☐ AERIAL

02 IN CUSTODY OF HALLIBURTON NUS ENVIRONMENTAL CORP.
Name of organization or individual

03 MAPS ✓ YES ☐ NO

04 LOCATION OF MAPS Halliburton NUS Envir. corp.

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA, STATE, & NUS FILES

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. CURRENT OWNER(S)			PARENT COMPANY (if applicable)		
01 NAME: C.B. Institutional Fund VI		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.): 1211 HAMBURG TURNPIKE Suite 201		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY: WAYNE	06 STATE: NJ	07 ZIP CODE: 07470	12 CITY	13 STATE	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
01 NAME		02 D+B NUMBER	08 NAME		09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)		11 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)			IV. REALTY OWNER(S) (If applicable, list most recent first)		
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA, STATE, AND NUS FILES

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

EPA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD086324188

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
Unknown	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME	02 D+B NUMBER
NAVTELL	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
3331 N.W. 55th Street	

05 CITY	06 STATE	07 ZIP CODE
Ft Lauderdale	FL	

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
Unknown	C.B. Institutional Fund VI

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA and State files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE
01 NAME		02 D+B NUMBER	01 NAME		02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NA

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ D. SPILLED MATERIAL REMOVED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ E. CONTAMINATED SOIL REMOVED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ F. WASTE REPACKAGED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ G. WASTE DISPOSED ELSEWHERE 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
waste materials were hauled off by municipal waste collectors

01 ☐ H. ON SITE BURIAL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ I. IN SITU CHEMICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ J. IN SITU BIOLOGICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ K. IN SITU PHYSICAL TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ L. ENCAPSULATION 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ M. EMERGENCY WASTE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ N. CUTOFF WALLS 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ O. EMERGENCY DIKING SURFACE WATER DIVERSION 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ P. CUTOFF TRENCHES/SUMP 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ Q. SUBSURFACE CUTOFF WALL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE: FLD 02 SITE NUMBER: FLD119624188

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ S. CAPPING/COVERING 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ T. BULK TANKAGE REPAIRED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ U. GROUT CURTAIN CONSTRUCTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ V. BOTTOM SEALED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ W. GAS CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ X. FIRE CONTROL 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ Y. LEACHATE TREATMENT 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ Z. AREA EVACUATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ 1. ACCESS TO SITE RESTRICTED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
There are no security measures in place to limit access to facility

01 ☐ 2. POPULATION RELOCATED 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

01 ☐ 3. OTHER REMEDIAL ACTIVITIES 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION
undocumented

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

STATE, EPA, AND NUS FILES.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	FLD118624188

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ☐ YES ☑ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

None

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA & STATE FILE MATERIALS

APPENDIX

I. FEEDSTOCKS

CAS Number	Chemical Name	CAS Number	Chemical Name	CAS Number	Chemical Name
1. 7664-41-7	Ammonia	14. 1317-38-0	Cupric Oxide	27. 7778-50-9	Potassium Dichromate
2. 7440-36-0	Antimony	15. 7758-98-7	Cupric Sulfate	28. 1310-58-3	Potassium Hydroxide
3. 1309-64-4	Antimony Trioxide	16. 1317-39-1	Cuprous Oxide	29. 115-07-1	Propylene
4. 7440-38-2	Arsenic	17. 74-85-1	Ethylene	30. 10588-01-9	Sodium Dichromate
5. 1327-53-3	Arsenic Trioxide	18. 7647-01-0	Hydrochloric Acid	31. 1310-73-2	Sodium Hydroxide
6. 21109-95-5	Barium Sulfide	19. 7664-39-3	Hydrogen Fluoride	32. 7646-78-8	Stannic Chloride
7. 7726-95-6	Bromine	20. 1335-25-7	Lead Oxide	33. 7772-99-8	Stannous Chloride
8. 106-99-0	Butadiene	21. 7439-97-6	Mercury	34. 7664-93-9	Sulfuric Acid
9. 7440-43-9	Cadmium	22. 74-82-8	Methane	35. 108-88-3	Toluene
10. 7782-50-5	Chlorine	23. 91-20-3	Napthalene	36. 1330-20-7	Xylene
11. 12737-27-8	Chromite	24. 7440-02-0	Nickel	37. 7646-85-7	Zinc Chloride
12. 7440-47-3	Chromium	25. 7697-37-2	Nitric Acid	38. 7733-02-0	Zinc Sulfate
13. 7440-48-4	Cobalt	26. 7723-14-0	Phosphorus		

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
1. 75-07-0	Acetaldehyde
2. 64-19-7	Acetic Acid
3. 108-24-7	Acetic Anhydride
4. 75-86-5	Acetone Cyanohydrin
5. 506-96-7	Acetyl Bromide
6. 75-36-5	Acetyl Chloride
7. 107-02-8	Acrolein
8. 107-13-1	Acrylonitrile
9. 124-04-9	Adipic Acid
10. 309-00-2	Aldrin
11. 10043-01-3	Aluminum Sulfate
12. 107-18-6	Allyl Alcohol
13. 107-05-1	Allyl Chloride
14. 7664-41-7	Ammonia
15. 631-61-8	Ammonium Acetate
16. 1863-63-4	Ammonium Benzoate
17. 1066-33-7	Ammonium Bicarbonate
18. 7789-09-5	Ammonium Bichromate
19. 1341-49-7	Ammonium Bifluoride
20. 10192-30-0	Ammonium Bisulfite
21. 1111-78-0	Ammonium Carbamate
22. 12125-02-9	Ammonium Chloride
23. 7788-98-9	Ammonium Chromate
24. 3012-65-5	Ammonium Citrate, Dibasic
25. 13826-83-0	Ammonium Fluoborate
26. 12125-01-8	Ammonium Fluoride
27. 1336-21-6	Ammonium Hydroxide
28. 6009-70-7	Ammonium Oxalate
29. 16919-19-0	Ammonium Silicofluoride
30. 7773-06-0	Ammonium Sulfamate
31. 12135-76-1	Ammonium Sulfide
32. 10196-04-0	Ammonium Sulfite
33. 14307-43-8	Ammonium Tartrate
34. 1762-95-4	Ammonium Thiocyanate
35. 7783-18-8	Ammonium Thiosulfate
36. 628-63-7	Amyl Acetate
37. 62-53-3	Aniline
38. 7647-18-9	Antimony Pentachloride
39. 7789-61-9	Antimony Tribromide
40. 10025-91-9	Antimony Trichloride
41. 7783-56-4	Antimony Trifluoride
42. 1309-64-4	Antimony Trioxide
43. 1303-32-8	Arsenic Disulfide
44. 1303-28-2	Arsenic Pentoxide
45. 7784-34-1	Arsenic Trichloride
46. 1327-53-3	Arsenic Trioxide
47. 1303-33-9	Arsenic Trisulfide
48. 542-62-1	Barium Cyanide
49. 71-43-2	Benzene
50. 65-85-0	Benzoic Acid
51. 100-47-0	Benzonitrile
52. 98-88-4	Benzoyl Chloride
53. 100-44-7	Benzyl Chloride
54. 7440-41-7	Beryllium
55. 7787-47-5	Beryllium Chloride
56. 7787-49-7	Beryllium Fluoride
57. 13597-99-4	Beryllium Nitrate
58. 123-86-4	Butyl Acetate
59. 84-74-2	n-Butyl Phthalate
60. 109-73-9	Butylamine
61. 107-92-6	Butyric Acid
62. 543-90-8	Cadimium Acetate
63. 7789-42-6	Cadmium Bromide
64. 10108-64-2	Cadmium Chloride
65. 7778-44-1	Calcium Arsenate
66. 52740-16-6	Calcium Arsenite
67. 75-20-7	Calcium Carbide
68. 13765-19-0	Calcium Chromate
69. 592-01-8	Calcium Cyanide
70. 26264-06-2	Calcium Dodecylbenzene Sulfonate
71. 7778-54-3	Calcium Hypochlorite
72. 133-06-2	Captan
73. 63-25-2	Carbaryl
74. 1563-66-2	Carbofuran
75. 75-15-0	Carbon Disulfide
76. 56-23-5	Carbon Tetrachloride
77. 57-74-9	Chlordane
78. 7782-50-5	Chlorine
79. 108-90-7	Chlorobenzene
80. 67-66-3	Chloroform
81. 7790-94-5	Chlorosulfonic Acid
82. 2921-88-2	Chlorpyrifos
83. 1066-30-4	Chromic Acetate
84. 7738-94-5	Chromic Acid
85. 10101-53-8	Chromic Sulfate
86. 10049-05-5	Chromous Chloride
87. 544-18-3	Cobaltous Formate
88. 14017-41-5	Cobaltous Sulfamate
89. 56-72-4	Coumaphos
90. 1319-77-3	Cresol
91. 4170-30-3	Crotonaldehyde
92. 142-71-2	Cupric Acetate
93. 12002-03-8	Cupric Acetoarsenite
94. 7447-39-4	Cupric Chloride
95. 3251-23-8	Cupric Nitrate
96. 5893-66-3	Cupric Oxalate
97. 7758-98-7	Cupric Sulfate
98. 10380-29-7	Cupric Sulfate Ammoniated
99. 815-82-7	Cupric Tartrate
100. 506-77-4	Cyanogen Chloride
101. 110-82-7	Cyclohexane
102. 94-75-7	2,4-D Acid
103. 94-11-1	2,4-D Esters
104. 50-29-3	DDT
105. 333-41-5	Diazinon
106. 1918-00-9	Dicamba
107. 1194-65-6	Dichlobenil
108. 117-80-6	Dichlone
109. 25321-22-6	Dichlorobenzene (all isomers)
110. 266-38-19-7	Dichloropropane (all isomers)
111. 26952-23-8	Dichloropropene (all isomers)
112. 8003-19-8	Dichloropropene-Dichloropropane Mixture
113. 75-99-0	2-2-Dichloropropionic Acid
114. 62-73-7	Dichlorvos
115. 60-57-1	Dieldrin
116. 109-89-7	Diethylamine
117. 124-40-3	Dimethylamine
118. 25154-54-5	Dinitrobenzene (all isomers)
119. 51-28-5	Dinitrophenol
120. 25321-14-6	Dinitrotoluene (all isomers)
121. 85-00-7	Diquat
122. 298-04-4	Disulfoton
123. 330-54-1	Diuron
124. 27176-87-0	Dodecylbenzenesulfonic Acid
125. 115-29-7	Endosulfan (all isomers)
126. 72-20-8	Endrin and Metabolites
127. 106-89-8	Epichlorohydrin
128. 563-12-2	Ethion
129. 100-41-4	Ethyl Benzene
130. 107-15-3	Ethylenediamine
131. 106-93-4	Ethylene Dibromide
132. 107-06-2	Ethylene Dichloride
133. 60-00-4	EDTA
134. 1185-57-5	Ferric Ammonium Citrate
135. 2944-67-4	Ferric Ammonium Oxalate
136. 7705-08-0	Ferric Chloride

II. HAZARDOUS SUBSTANCES

CAS Number	Chemical Name
137. 7783-50-8	Ferric Fluoride
138. 10421-48-4	Ferric Nitrate
139. 10028-22-5	Ferric Sulfate
140. 10045-89-3	Ferrous Ammonium Sulfate
141. 7758-94-3	Ferrous Chloride
142. 7720-78-7	Ferrous Sulfate
143. 206-44-0	Fluoranthene
144. 50-00-0	Formaldehyde
145. 64-18-6	Formic Acid
146. 110-17-8	Fumaric Acid
147. 98-01-1	Furfural
148. 86-50-0	Guthion
149. 76-44-8	Heptachlor
150. 118-74-1	Hexachlorobenzene
151. 87-68-3	Hexachlorobutadiene
152. 67-72-1	Hexachloroethane
153. 70-30-4	Hexachlorophene
154. 77-47-4	Hexachlorocyclopentadiene
155. 7647-01-0	Hydrochloric Acid (Hydrogen Chloride)
156. 7664-39-3	Hydrofluoric Acid (Hydrogen Fluoride)
157. 74-90-8	Hydrogen Cyanide
158. 7783-06-4	Hydrogen Sulfide
159. 78-79-5	Isoprene
160. 42504-46-1	Isopropanolamine Dodecylbenzenesulfonate
161. 115-32-2	Kelthane
162. 143-50-0	Kepone
163. 301-04-2	Lead Acetate
164. 3687-31-8	Lead Arsenate
165. 7758-95-4	Lead Chloride
166. 13814-96-5	Lead Fluoborate
167. 7783-46-2	Lead Fluoride
168. 10101-63-0	Lead Iodide
169. 18256-98-9	Lead Nitrate
170. 7428-48-0	Lead Stearate
171. 15739-80-7	Lead Sulfate
172. 1314-87-0	Lead Sulfide
173. 592-87-0	Lead Thiocyanate
174. 58-89-9	Lindane
175. 14307-35-8	Lithium Chromate
176. 121-75-5	Malthion
177. 110-16-7	Maleic Acid
178. 108-31-6	Maleic Anhydride
179. 2032-65-7	Mercaptodimethur
180. 592-04-1	Mercuric Cyanide
181. 10045-94-0	Mercuric Nitrate
182. 7783-35-9	Mercuric Sulfate
183. 592-85-8	Mercuric Thiocyanate
184. 10415-75-5	Mercurous Nitrate
185. 72-43-5	Methoxychlor
186. 74-93-1	Methyl Mercaptan
187. 80-62-6	Methyl Methacrylate
188. 298-00-0	Methyl Parathion
189. 7786-34-7	Mevinphos
190. 315-18-4	Mexacarbate
191. 75-04-7	Monoethylamine
192. 74-89-5	Monomethylamine
193. 300-76-5	Naled
194. 91-20-3	Naphthalene
195. 1338-24-5	Naphthenic Acid
196. 7440-02-0	Nickel
197. 15699-18-0	Nickel Ammonium Sulfate
198. 37211-05-5	Nickel Chloride
199. 12054-48-7	Nickel Hydroxide
200. 14216-75-2	Nickel Nitrate
201. 7786-81-4	Nickel Sulfate
202. 7697-37-2	Nitric Acid
203. 98-95-3	Nitrobenzene
204. 10102-44-0	Nitrogen Dioxide
205. 25154-55-6	Nitrophenol (all isomers)
206. 1321-12-6	Nitrotoluene
207. 30525-89-4	Paraformaldehyde
208. 56-38-2	Parathion
209. 608-93-5	Pentachlorobenzene
210. 87-86-5	Pentachlorophenol
211. 85-01-8	Phenanthrene
212. 108-95-2	Phenol
213. 75-44-5	Phosgene
214. 7664-38-2	Phosphoric Acid
215. 7723-14-0	Phosphorus
216. 10025-87-3	Phosphorus Oxychloride
217. 1314-80-3	Phosphorus Pentasulfide
218. 7719-12-2	Phosphorus Trichloride
219. 7784-41-0	Potassium Arsenate
220. 10124-50-2	Potassium Arsenite
221. 7778-50-9	Potassium Bichromate
222. 7789-00-6	Potassium Chromate
223. 7722-64-7	Potassium Permanganate
224. 2312-35-8	Propargite
225. 79-09-4	Propionic Acid
226. 123-62-6	Propionic Anhydride
227. 1336-36-3	Polychlorinated Biphenyls
228. 151-50-8	Potassium Cyanide
229. 1310-58-3	Potassium Hydroxide
230. 75-56-9	Propylene Oxide
231. 121-29-9	Pyrethrins
232. 91-22-5	Quinoline
233. 108-46-3	Resorcinol
234. 7446-08-4	Selenium Oxide
235. 7761-88-8	Silver Nitrate
236. 7631-89-2	Sodium Arsenate
237. 7784-46-5	Sodium Arsenite
238. 10588-01-9	Sodium Bichromate
239. 1333-83-1	Sodium Bifluoride
240. 7631-90-5	Sodium Bisulfite
241. 7775-11-3	Sodium Chromate
242. 143-33-9	Sodium Cyanide
243. 25155-30-0	Sodium Dodecylbenzene Sulfonate
244. 7681-49-4	Sodium Fluoride
245. 16721-80-5	Sodium Hydrosulfide
246. 1310-73-2	Sodium Hydroxide
247. 7681-52-9	Sodium Hypochlorite
248. 124-41-4	Sodium Methylate
249. 7632-00-0	Sodium Nitrate
250. 7558-79-4	Sodium Phosphate, Dibasic
251. 7601-54-9	Sodium Phosphate, Tribasic
252. 10102-18-8	Sodium Selenite
253. 7789-06-2	Strontium Chromate
254. 57-24-9	Strychnine and Salts
255. 100-42-5	Styrene
256. 12771-08-3	Sulfur Monochloride
257. 7664-93-9	Sulfuric Acid
258. 93-76-5	2,4,5-T Acid
259. 2008-46-0	2,4,5-T Amines
260. 93-79-8	2,4,5-T Esters
261. 13560-99-1	2,4,5-T Salts
262. 93-72-1	2,4,5-TP Acid
263. 32534-95-5	2,4,5-TP Acid Esters
264. 72-54-8	TDE
265. 95-94-3	Tetrachlorobenzene
266. 127-18-4	Tetrachloroethane
267. 78-00-2	Tetraethyl Lead
268. 107-49-3	Tetraethyl Pyrophosphate
269. 7446-18-6	Thallium (I) Sulfate
270. 108-88-3	Toluene
271. 8001-35-2	Toxaphene
272. 12002-48-1	Trichlorobenzene (all isomers)
273. 52-68-6	Trichlorfon
274. 25323-89-1	Trichloroethane (all isomers)
275. 79-01-6	Trichloroethylene
276. 25167-82-2	Trichlorophenol (all isomers)
277. 27323-41-7	Triethanolamine Dodecylbenzenesulfonate
278. 121-44-8	Triethylamine
279. 75-50-3	Trimethylamine
280. 541-09-3	Uranyl Acetate
281. 10102-06-4	Uranyl Nitrate
282. 1314-62-1	Vanadium Pentoxide
283. 27774-13-6	Vanadyl Sulfate
284. 108-05-4	Vinyl Acetate
285. 75-35-4	Vinylidene Chloride
286. 1300-71-6	Xylenol
287. 557-34-6	Zinc Acetate
288. 52628-25-8	Zinc Ammonium Chloride
289. 1332-07-6	Zinc Borate
290. 7699-45-8	Zinc Bromide
291. 3486-35-9	Zinc Carbonate
292. 7646-85-7	Zinc Chloride
293. 557-21-1	Zinc Cyanide
294. 7783-49-3	Zinc Fluoride
295. 557-41-5	Zinc Formate
296. 7779-86-4	Zinc Hydrosulfite
297. 7779-88-6	Zinc Nitrate
298. 127-82-2	Zinc Phenolsulfonate
299. 1314-84-7	Zinc Phosphide
300. 16871-71-9	Zinc Silicofluoride
301. 7733-02-0	Zinc Sulfate
302. 13746-89-9	Zirconium Nitrate
303. 16923-95-8	Zirconium Potassium Fluoride
304. 14644-61-2	Zirconium Sulfate
305. 10026-11-6	Zirconium Tetrachloride

F.L.E.W.

REFERENCE # 1

A. SITE DESCRIPTION. This site is located in a commercial/industrial area at 3331 NW 55 Street, Fort Lauderdale, Broward County, Florida. Navtell was involved in the repair and sales of data communications test equipment. It is not known how long Navtell was located at this site but it was apparently in operation through the summer of 1984. N.B.C. of Broward is now located at this site. There is no information on N.B.C. of Broward.

B. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS. Approximately 20 gallons per year of cleaning solvents were used at this facility. Any spent solvents were contained in various small containers until they were picked up by municipal trash collection. Soldering was also done at this facility.

C. NATURE OF HAZARDOUS MATERIALS. Twenty (20) gallons per year of cleaning solvents were used at this facility. The chemical composition of the solvent is unknown, however, we assume that it is toxic, flammable and volatile. It is not known if any hazardous substances are presently used onsite.

D. ROUTES OF CONTAMINATION. Possible routes of contamination include groundwater, surface water and direct contact.

E. POSSIBLE AFFECTED POPULATION AND RESOURCES. Area residents are provided with drinking water from the city of Fort Lauderdale Executive/Prospect municipal wellfield. The wellfield draws from the Biscayne aquifer, which is a shallow, permeable, sole-source aquifer. The site is located within 1000 feet of the nearest well, thus potential contaminants in the groundwater, surface water or soil on-site may contaminate the wellfield.

The facility was located within 1000 feet of the nearest body of water, thus potentially contaminated groundwater or surface runoff could contaminate surface water supplies, affecting recreational users and aquatic flora and fauna.

Workers may have been exposed to hazardous substances via inhalation of volatilized cleaning solvent or direct contact.

F. RECOMMENDATIONS AND JUSTIFICATIONS. There is no information about N.B.C. of Broward, which is now located at this site. Since the amount of waste generated per year was small when Navtell was located on-site, we recommend a low priority for inspection at this site.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: FL | 02 SITE NUMBER: D118624138

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Navtell	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: 3331 NW 55th Street				
03 CITY: Fort Lauderdale	04 STATE: FL	05 ZIP CODE: 33309	06 COUNTY: Broward	07 COUNTY CODE: 011	08 CONG DIST: 017
09 COORDINATES LATITUDE: 26 11 5 5.	LONGITUDE: 0 80 1 1 3 0.				

10 DIRECTIONS TO SITE (Starting from nearest public road)
Proceed north from Ft. Lauderdale on I-95. Exit at Commercial Blvd. and proceed west 2 miles to NW 31 Ave. Turn right on NW 31 Ave. and proceed north ¼ mile to Prospect Rd. Turn left on Prospect Rd. and proceed 3/4 mile to NW 35 Ave. Turn left on NW 35 Ave. and turn left onto NW 55 Street. The site is located on the left in the Business Plaza.

III. RESPONSIBLE PARTIES

01 OWNER (if known): Same as above.	02 STREET (Business, mailing, residential):		
03 CITY:	04 STATE:	05 ZIP CODE:	06 TELEPHONE NUMBER: ( )
07 OPERATOR (if known and different from owner): Linda Johnston	08 STREET (Business, mailing, residential): 3331 NW 55th Street		
09 CITY: Ft. Lauderdale	10 STATE: FL	11 ZIP CODE: 33309	12 TELEPHONE NUMBER: (305) 486-7122

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: ______ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: ______ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE __/__/__ (MONTH DAY YEAR)
☐ NO
BY (Check all that apply) ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR ☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ______ (Specify)
CONTRACTOR NAME(S): ______

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
______ | ______ (BEGINNING YEAR | ENDING YEAR) ☒ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
This facility repaired and sold data communications test equipment. Cleaning solvents wer used at the rate of 20 gallons per year. Spent solvents were put in small containers and picked up by a municipal collector.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
Spills of cleaning solvent could contaminate groundwater, drinking water, surface water and soils. Workers may also come in direct contact with cleaning solvent.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: Eric Nuzie Cuthbert S. Hill	02 OF (Agency/Organization): FDER			03 TELEPHONE NUMBER: (904) 488-019
04 PERSON RESPONSIBLE FOR ASSESSMENT: Willard Murray	05 AGENCY: N/A	06 ORGANIZATION: E.C. Jordan Co.	07 TELEPHONE NUMBER: (207) 775-5401	08 DATE: 11/6/85 (MONTH DAY YEAR)

MEM

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D11862418X

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+ — 04 NARRATIVE DESCRIPTION

Spills of spent solvents from various small containers stored on-site may contaminate the groundwater. No spills have been reported and no samples have been taken.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+ — 04 NARRATIVE DESCRIPTION

This facility is located within 1000 feet of the nearest body of water. Therefore, potentially contaminated surface water runoff or groundwater could contaminate nearby surface waters.

01 [X] C. CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE: ______) [ ] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION

Remote potential. The amount of waste generated is very small, thus, posing little threat to the general air quality.

01 [X] D. FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1-100 — 04 NARRATIVE DESCRIPTION

The cleaning solvents used on-site are most likely volatile or flammable. However, no incidents of fire have been reported.

01 [X] E. DIRECT CONTACT — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1-100 — 04 NARRATIVE DESCRIPTION

The workers may come in direct contact with cleaning solvents which may be toxic and volatile.

01 [X] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 0.5 (Acres) — 04 NARRATIVE DESCRIPTION

Spills of spent solvents may contaminate the soil on-site. No spills have been reported and no soil samples have been taken.

01 [X] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+ — 04 NARRATIVE DESCRIPTION

Area residents are provided with drinking water from the Ft. Lauderdale Executive/ Prospect municipal wellfield which produces from the shallow, permeable Biscayne aquifer. The site is located 1000 feet from the nearest well, and potential contaminants in the groundwater may reach the wellfield.

01 [X] H. WORKER EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 WORKERS POTENTIALLY AFFECTED: 1-100 — 04 NARRATIVE DESCRIPTION

Workers may be exposed to hazardous substances via inhalation of volatilized compounds or direct contact with cleaning solvent. Workers may also be injured in the event of a fire.

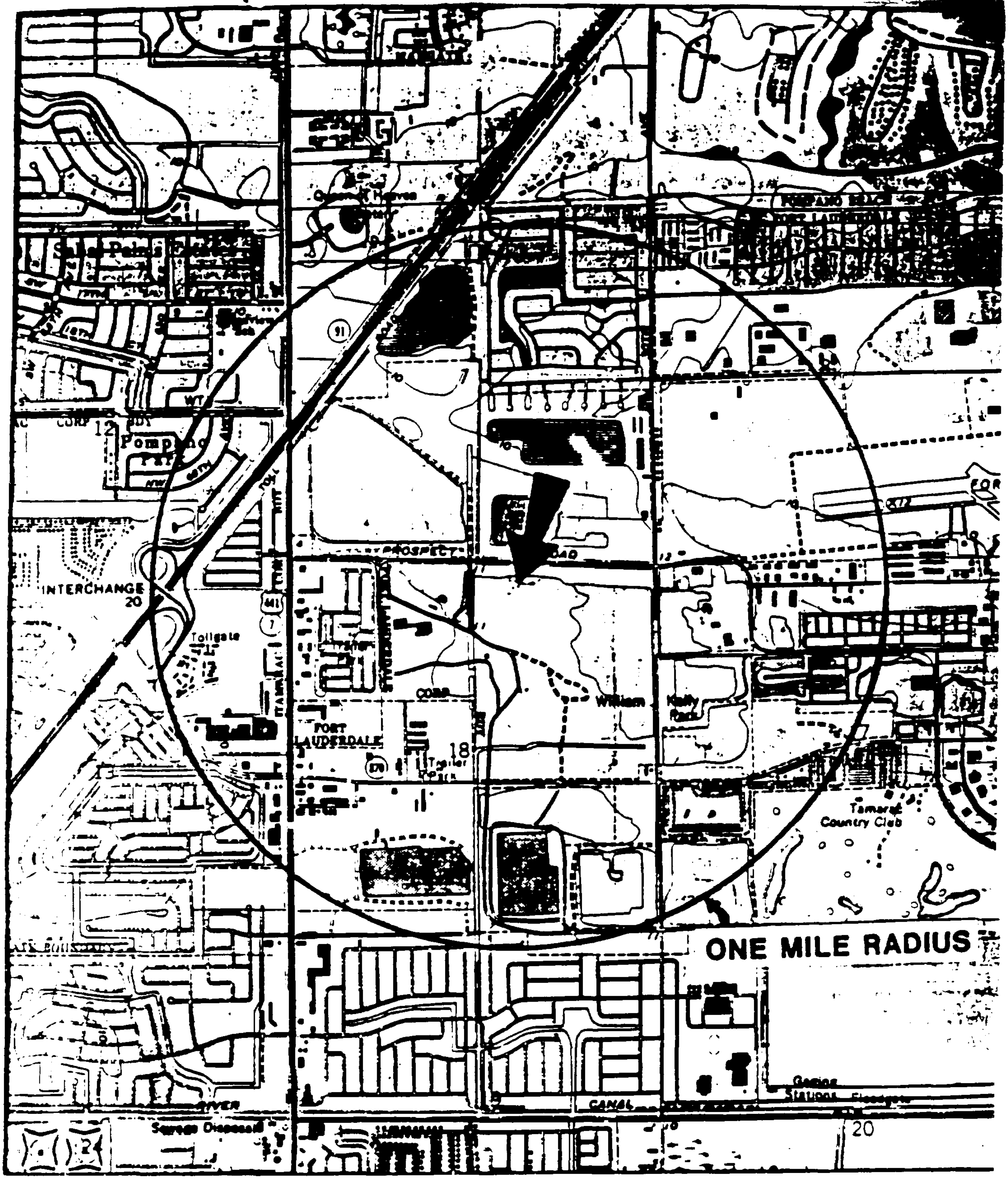
01 [X] I. POPULATION EXPOSURE/INJURY — 02 [ ] OBSERVED (DATE: ______) [X] POTENTIAL [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+ — 04 NARRATIVE DESCRIPTION

Area residents may be exposed to contaminants via drinking water, groundwater used for irrigation and other purposes, or surface water.

ATTACHMENT A
NAVTELL
FLD118624188

ON-SITE INSPECTIONS

DATE	AGENCY	SAMPLES	COMMENTS
08/14/85		No	Off-site windshield surv N.B.C. of Broward now oc this site.
08/09/84	BCEQCB	No	Hazardous Waste Survey



SCALE 1 : 24000

1/2 1 MILE

1000 0 1000 2000 FEET

N

SITE LOCATION MAP

Navtell

3331 NW 55th Street

USGS QUAD Ft. Lauderdale North

DATE 1983

REFERENCE LIST

1. Environmental Protection Agnecy, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH; Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Florida Department of Natural Resources, Water Resources of Broward County, Report of Investigation No. 65, 1973.

6. Florida Division of Geology, Chemical Quality of Waters of Broward County, Florida, Report of Investigations No. 51, 1968.

7. Florida Geological Survey, Biscayne Aquifer of Dade and Broward Counties, Florida, Report of Investigation No. 17, 1958.

8. Florida Geological Survey, Groundwater Resources of the Oakland Park Area of Eastern Broward County, Florida, Report of Investigation No. 20, 1959.

9. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

10. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

11. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1. NUS Corporation, Superfund Division.

12. NUS Training Manual, Project for Performance of Remedial Reponse Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

13. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

14. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

15. U.S. Geological Survey, Topographic Map, 1-24,000 Series.

16. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.

"Rite in the Rain" - A unique All-Weather Writing Paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather.

Available in a variety of standard and custom printed case-bound field books, loose leaf, spiral and stapled notebooks, multi-copy sets and computer papers.

"Rite in the Rain" All-Weather Writing Papers are also available in a wide selection of rolls and sheets for printing and photocopying.

a product of

J. L. DARLING CORPORATION
TACOMA, WA 98421-3696 USA

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

F4-2345

Navtell
Fort Lauderdale,
Broward County, Florida
TDD # F4-9005-71
Terry Ryland P.M.

REFERENCE # 2

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1. Record on front cover of the Logbook: TDD No., Site Name, Site Location, Project Manager.
2. All entries are made using ink. Draw a single line through errors. Initial and date corrections.
3. Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures.
4. Record weather conditions and general site information.
5. Sign and date each page. Project Manager is to review and sign off on each logbook daily.
6. Document all calibration and pre-operational checks of equipment. Provide serial numbers of equipment used onsite.
7. Provide reference to Sampling Field Sheets for detailed sampling information.
8. Describe sampling locations in detail and document all changes from project planning documents.
9. Provide a site sketch with sample locations and photo locations.
10. Maintain photo log by completing the stamped information at the end of the logbook.
11. If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook.
12. Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents.
13. Complete SMO information in the space provided.

The following people have read and understand the work plan.

Terry Ryland
Terry Ryland 5-30-90

Ron Wilde
Ronald Wilde 5-30-90

Terry Ryland 5-30-90

Weather: Hot & clear

12:44 Arrived at site. Navitell is no longer in business at this site.

Navitell was located in an office park at 3331 NW 55th street in Fort Lauderdale.

The Office Park is named "Two Prospect Park." Office 3331 is facing prospect rd.

Across prospect road is what appears to be a large well with electric pump on top. Several wells are actually visible along

[signature] 5-30-90

prospect road.

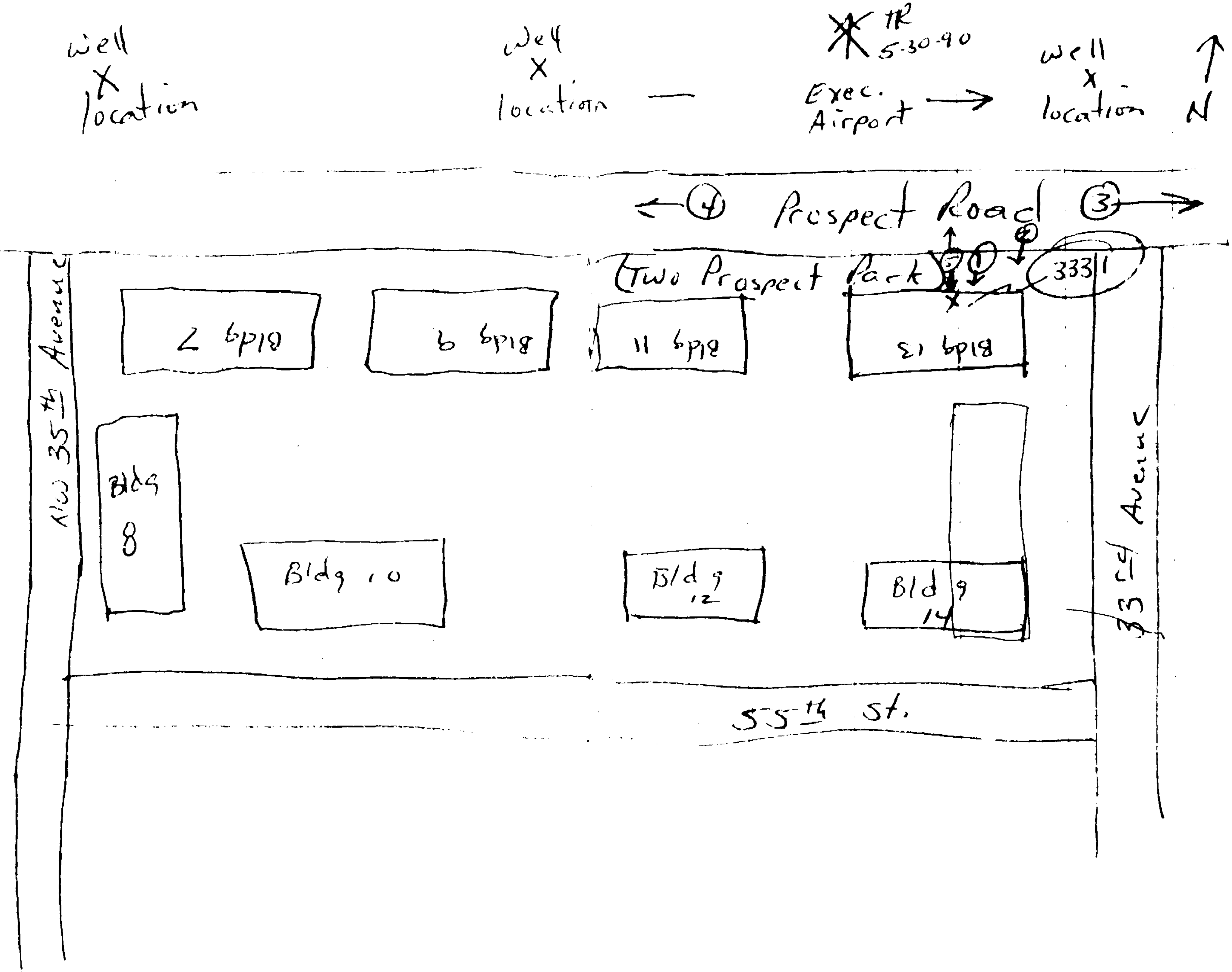
Intelecom Information Systems, Inc. now occupies the office where Navitell was once located. No furniture is noticed within the office. Appears the new tenants are either coming or going.

3331 NW 55th St. is found in building 13 of "Two Prospect Park."

A trailer park is 1/4 of a mile west of the office park.

A county park/wetlands area is located within 2 miles north of the site.

[signature] 5-30-90


well
X
location
Well
X
location
5-30-90
Exec.
Airport
well
x
location
N
4
Prospect Road
3
Two Prospect Park
3331
Bldg 7
Bldg 9
Bldg 11
Bldg 13
NW 35th Avenue
Bldg 8
Bldg 10
Bldg 12
Bldg 14
33rd Avenue
55th St.

5-30-90 5-30-90

Area appears to be commercial with some residential houses within 1 mile.

Executive airport located ≈ 1 mile ~~to~~ east of the site.
JR
5-30-90

[signature] 5-30-90

11:53 Arrived at tax assessors office.

Folio # 9218-16 028

Property owned by

CB Institutional Fund VI
% Property Evaluation Services
1211 Hamburg Turnpike
Suite 201
Wayne, New Jersey
07470

Prospect Industrial and Commercial Park

[signature] 5-31-90

FY-9005-71
5/30/90 By Whom T. Nyland
1244 4
Prospect Rd
facing west, side of bldg

FY-9005-71
5/30/90 T. Nyland
1244 5
Parking Lot
City well located across Prospect Rd from site

TDD # FY-9005-71
Date 5/30/90 T. Ryland
1244 1
Prospect rd
front of bldg, door

TDD # FY-9005-71
5/30/90 T. Ryland
1244 2
Prospect rd
sign in front of bldg

FY-9005-71
5/30/90 T. Ryland
1244 3
Prospect rd
facing east, along side of bldg

STANDARD SAMPLE CODES

Water Samples

PW - Private well
PB - Public (Municipal) Well
MW - Monitoring (Permanent) Well
TW - Temporary (Well Point) Well
IW - Industrial Well
SW - Surface Water
SP - Spring Water
LW - Leachate Water

Soil Samples

SS - Surface Soil
SB - Subsurface Soil
SZ - Saturation Zone
SD - Sediment
CS - Composite Soil
LS - Leachate Soil

OTHER CODES

AR - Air
SL - Sludge
WA - Waste
DR - Drum

QC - Quality Control
AQ - Aquatic (Biological)
TB - Trip Blank

For all samples that are to be analyzed by the in house FIT IV laboratory, the following deviation from the standard codes are to be used: The letter "F" (denoting FIT Lab Analysis) is to be inserted in front of the sample number.

Example: Standard Auto Sampling Investigation - Temporary Well Groundwater Sample - Number 08

Appropriate Code: SA-TW-F08

NUS CORPORATION AND SUBSIDI/ REFERENCE # 3 **TELECON NOTE**

CONTROL NO.:	DATE:	TIME:
F4-9102-04	09/11/91	13:20

DISTRIBUTION:

Navtell
Fort Lauderdale,Broward County, Florida

BETWEEN: Angela Teagle	OF: E.P.A.	PHONE: (404)347-5065

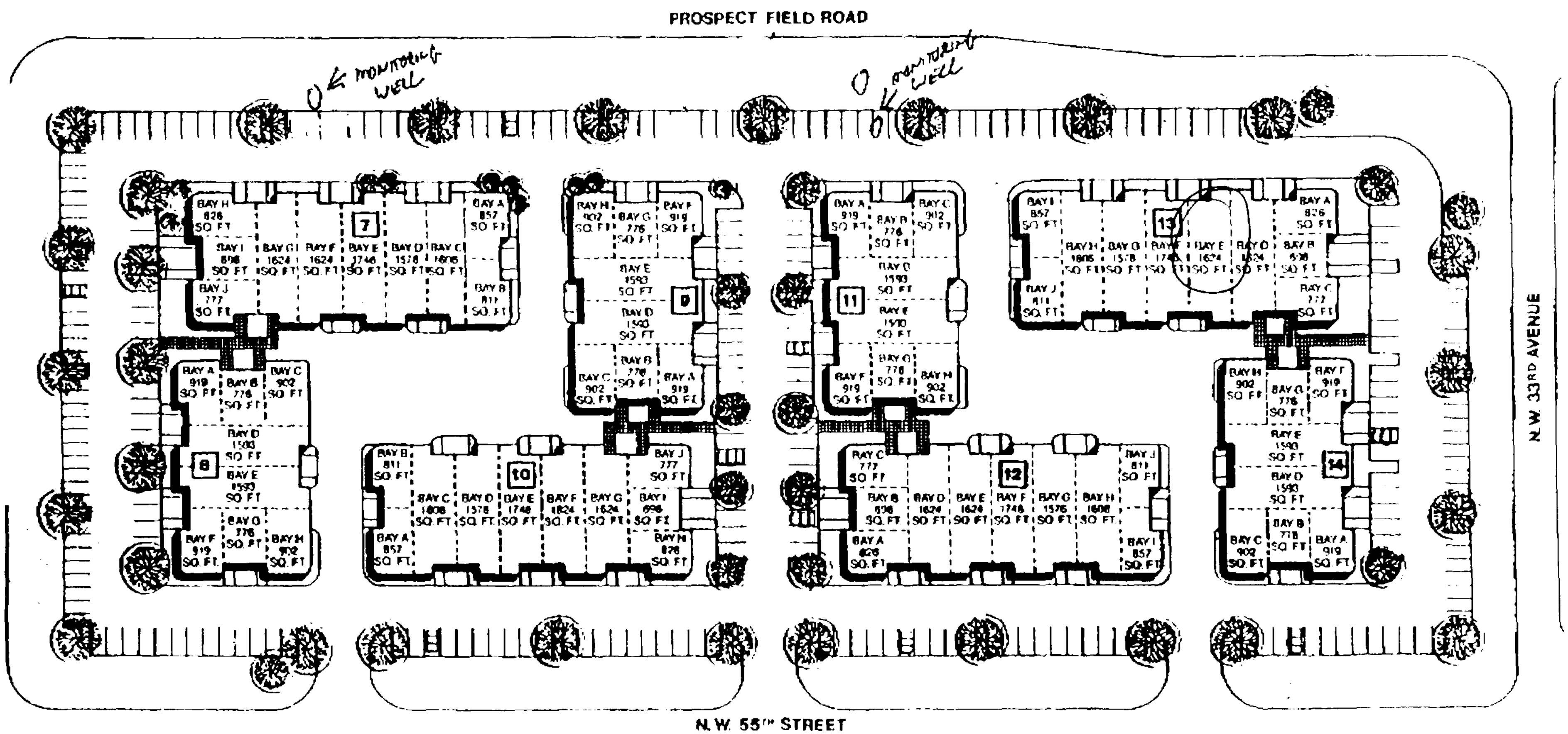
AND:
Keith Hazen

Keith Hazen

DISCUSSION:

The regulatory history of the Navtell Facility. Angela Teagle stated that there was no regulatory information, in either the E.P.A. or state files, for the Navtell facility. Angela said Navtell never filed with a · government agency.

TWO PROSPECT PARK



APR 04 '91 17:03 FARBMAN / STEIN

FEATURES

• Suites from 496 S.F

• Interior columns spaced to permit flexible planning and

• Full brick facade

• All copper electrical wiring

For Leasing In

Contact: 766-

REFERENCE # 5

"**Rite in the Rain**" - A unique All Weather Writing Paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather.

Available in a variety of standard and custom printed case-bound field books, loose leaf, spiral and stapled notebooks, multi-copy sets and computer papers.

"**Rite in the Rain**" All-Weather Writing Papers are also available in a wide selection of rolls and sheets for printing and photocopying.

a product of

J. L. DARLING CORPORATION

TACOMA, WA 98421-3696 USA

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

[illegible]

[illegible]

[illegible]

[illegible]

LOGBOOK REQUIREMENTS
REVISED - NOVEMBER 29, 1988

NOTE: ALL LANGUAGE SHOULD BE FACTUAL AND OBJECTIVE

1 Record on front cover of the Logbook TDD No., Site Name, Site Location, Project Manager

2 All entries are made using ink. Draw a single line through errors. Initial and date corrections

3 Statement of Work Plan, Study Plan, and Safety Plan discussion and distribution to field team with team members' signatures

4 Record weather conditions and general site information

5 Sign and date each page. Project Manager is to review and sign off on each logbook daily

6 Document all calibration and pre operational checks of equipment. Provide serial numbers of equipment used onsite

7 Provide reference to Sampling Field Sheets for detailed sampling information

8 Describe sampling locations in detail and document all changes from project planning documents

9 Provide a site sketch with sample locations and photo locations

10 Maintain photo log by completing the stamped information at the end of the logbook

11 If no site representative is on hand to accept the receipt for samples, an entry to that effect must be placed in the logbook

12 Record I.D. numbers of COC and receipt for sample forms used. Also record numbers of destroyed documents

13 Complete SMO information in the space provided

We, the undersigned, have read and understand the study plan, work plan, and health and safety plan and we understand the scope of the investigation

ERIC TSCHUDI
JERRY SAWYER
Stephanie [illegible]
MATTHEW McCay
[illegible] KASTAK

2

Sample code	date	time	depth	Description	pH	Cond	T °F	misc
~~CG~~ NV-TB-01W	3/20/91	7:00						
~~CG~~ NV-PB-01	3/20/91	7:00						
~~CG~~ NV-TB-01S	3/20/91	7:00						
~~CG~~ NV-SS-02	3/20/91	10.15	6"	dark gray gravelly sand				
NV-SS-01	3/20/91	10.35	9"	~~dark~~ gray-tan gravelly sand				
NV-SB-01	3/20/91	11.45	6.5 Ft	dark gray very coarse moist sand				
NV-SB-02	3/20/91	12.55	9 Ft	dark gray gravelly sand				
NV-SS-03	3/20/91	13.50	12"	black coarse sand				
NV-SB-03	3/20/91	14.05	6 Ft	green-gray very gravelly saturated sand				
NV-MW02	3/20/91	14:35	25 Ft	light gray cloudy water	6.86	~~121~~ 1002	89.5	
NV-MW01	3/20/91	16:30	25 Ft	light gray cloudy water	5.66	843	83	

3/20/91 Sunny, warm, breezy

7:30
Larry and Scott calibrated the instruments:
OVA 683964 calibrated to 99 ppm with methane
HNU 336439 calibrated to 54 ppm with 9.8 span using isobutylene

8:00
Jerry Sawyer collected the trip and preservative blank at 7:00. See p. 4 for details

9:30
I met with Lee Tomback, and explained what we had planned. He showed me his sample containers, but had no coolers, ice or preservatives. We called EPA and Susan Ochl explained the liability concerns and the problem with holding unpreserved samples indefinitely.

Lee decided not to split samples unless our data showed elevated levels of a contaminant. A representative of Farbman-Stein Management Co., Ken Koraczewski will accompany us while sampling. He said that this section of the complex was Two Prospect Park and the entire complex is Ft Lauderdale Commerce Center
~~10:00~~ 3/21/91
10:00 Terry said that water was very deep here. That makes sense since the wellfield is about 250 feet north of here.
We will collect surface soil and subsurface soil at the saturated zone

10:10
Jay and Matt are at our background location. They hit rock at 1 foot. They will use the beaver.

10:15
Eric and Stephanie are moving to the location for NV-55, SB-02

3/20/91

10:15
Eric and Stephanie collected NV-SS-02. See p. 2 for details. 3/20/91
No readings on the HNU or OVA

10:35
Jay and Matt are collecting NV-SS-01. See p. 2 for details 3/20/91

No readings on the HNU or OVA.

10:45
The little beaver wasn't working so the guys will go get another. The soil is too gravelly to hand auger.

There is a monitoring well about 120 feet NW of the corner of the building. Another one is located west of here. We'll sample them.

3/20/91

11:30
Jay and Matt power augered down about 18 inches before they hit gray sand. The gravelly sand appears to be fill. They will hand auger down to about 8 feet for a sample.

11:35
Eric, Stephanie will purge the monitoring well and sample it. This is the closest well

11:40
The OVA went down, so we'll use the HNU only. It's fairly breezy so we'll also stand upwind.

11:45
Matt and Jay collected NV-SB-~~02~~ 3 See p. 2 for details.

3/22/91

11:55
Eric and Stephanie will purge the 4 inch monitoring well, NV-MW-02
The volume to be purged is
$\pi r^2 (h)(3)(7.28 \text{ gal/ft})$

$3.14(0.167)^2(h)(3)(7.28 \text{ gals/ft})$
$= 2.0$ gallons/ft

The well is 25.0 feet and it is 17.0 feet to water. The column is 8 feet

Vol purged $= 8(2) = 16$ gallons

12:00
Matt and Jay will power auger NV-SB-02.

12:05
No HNU readings when the cap was unlocked by Ken and opened

3/22/91

12:15
After 5.5 gallons, the well purged dry. The water is very cloudy - full of light gray sediment. We'll let it recharge for about 30 minutes, and come back to collect the sample.

12:55
Jay, Matt and I collected NV-SB-
See p. 2 for details

13:30
We arrived at the location for NV-SS, SB-03 - about 30 feet east of the building and on the grassed area. Stephanie collected ~~Matt~~ 3/22/91 NV-SS-03. See p. 2. No readings on the HNu

14:05
We power augered down to 6 feet and hit a lot of limestone. We'll collect the sample here.
See p. 2 for details

3/20/91

14:35
Eric and I went to monitoring well 02 and began to sample. See p. 2 for details

14:50
Eric calibrated conductivity meter 683956 to 7.0 and 2001 with standards. He ran the parameters

16:00
We arrived at NV-MW-01 and began to purge.

The well is about 25 feet deep and the column is at 19 feet. The column is 6 feet

The volume to purge is:
$$\pi (2/12)^2 (6)(3)(7.28 \text{ gal}/ft^3) =$$
12 gallons

3/20/91

16:30
Eric purged the 12 gallons, and we collected NV-MW-01 along with the matrix duplicate.

17:00
We broke down the base and headed for the warehouse.

17:50
Eric calibrated the conductivity meter 683956 to 7.0 and to 2000 umhos with the standards. He then ran the parameters on NV-MW-01

18:00
We finished packing, processing and doing paperwork for the samples.

No city found ! press RETURN to try again.

REFERENCE # 6

COVERAGE

STATE	COUNTY	STATE NAME	COUNTY NAME
12	11	Florida	Broward Co

CENTER POINT AT STATE : 12 Florida
COUNTY : 11 Broward Co

Press RETURN key to continue...

REGION OF THE COUNTRY

Zipcode found: 33309 at a distance of 1.2 Km

STATE	CITY NAME	FIPSCODE	LATITUDE	LONGITUDE
FL	FORT LAUDERDALE	12011	26.1933	80.1817

Press RETURN key to continue ...

CENSUS DATA

Navtell
LATITUDE 26:11:37 LONGITUDE 80:11:39 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	0	5855	15017	20872
S 2	0	0	0	4840	3238	8064	16142
S 3	0	0	1001	1238	3684	12073	17996
S 4	0	0	937	0	8004	13787	22728
S 5	0	0	0	6249	9707	25393	41349
S 6	0	0	0	9105	8571	17191	34867
S 7	0	0	0	2394	11385	4099	17878
S 8	0	0	0	9081	4721	27435	41237
RING TOTALS	0	0	1938	32907	55165	123059	213069

Press RETURN key to continue ...

STAR STATION

INDEX NUMBER	STATION NAME	LATITUDE DEGREE	LONGITUDE DEGREE	PERIOD OF RECORD	STABILITY CLASSES	DISTANCE (km)
12839	MIAMI FL	25.8000	80.2667			6 44.32
12844	WEST PALM BEACH FL	26.6833	80.1000			5 55.20
12835	FT MYERS/PAGE FL	26.5833	81.8667			6171.99
12868	CAPE CANAVERAL FL	28.4833	80.5667			6257.02
12815	ORLANDO/JET PORT FL	28.4500	81.3000			6273.41
12810	TAMPA/MACDILL FL	27.8500	82.5167			5294.43
12842	TAMPA FL	27.9667	82.5333			6303.86

Press RETURN key to continue ...

U.S. SOIL DATA

STATE : FLORIDA

LATITUDE : 26:11:37 LONGITUDE : 80:11:39
THE STATION IS INSIDE H.U. 3090202

GROUND WATER ZONE	:	10			
RUNOFF SOIL TYPE	:	4			
EROSION	:	6.2250E-05			CM/MONTH
DEPTH TO GROUND WATER BETWEEN	:	0.0000E+00	AND	1.0000E+02	
FIELD CAPACITY FOR TOP SOIL	:	9.0000E-02			
EFFECTIVE POROSITY BETWEEN	:	2.0000E-02	AND	3.0000E-01	
SEEPAGE TO GROUNDWATER BETWEEN	:	4.6330E+03	AND	1.3900E+04	CM/MONTH
DISTANCE TO DRINKING WELL	:	2.7000E+04			CM

Press RETURN key to continue ...

U.S. CITY

MENU: Geodata Handling Data List procedures

1. Site level retrieval of data (SITERET)
2. Access Census Data (CENSUS)
3. Determine County Coverage (COVERAGE)
4. Geographic Data Management (GEODM)
5. HUCODE/SOIL locator (HUCODE)
6. Convert to Lat/Long (LATLON)
7. Lookup/Examine Star Station Data (STAR)
8. Find US cities (USCITY)
9. Find Soil Survey Status of Counties (SSURVEY)

Enter an option number or a procedure name (in parentheses)
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS>

Enter an option number or a procedure name (in parentheses)
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR

```
GEMS>

Enter an option number or a procedure name (in parentheses)
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> EXIT

Type YES to confirm the EXIT command; type NO to restart GEMS
GEMS> YES
$
$ LOGOUT
 WRT          logged out at  6-AUG-1991 11:45:43.00
 Itemized resource charges, for this session, follow:

NODE: VAXTM1
ACCT: NTIS                              START TIME:     6-AUG-1991 11:41:52.13
PROJ: NTISNUCN                          FINISH TIME:    6-AUG-1991 11:45:43.00
USER: WRT                               BILLING PERIOD:910801
UIC:  [000750,000112]                   WEEKDAY:       TUESDAY
BAUD:                                   TERMINAL PORT: VTA501

DESCRIPTION OF CHARGE                    QUANTITY              EXPENDITURE
--------------------------------------------------------------------------

  ALL CHARGE LEVELS
    300  baud            (Seconds)           231                    0.0000
    CPU TIME             (Seconds)             8                    0.4444
                                                               -----------
    TOTAL FOR THIS SESSION                                     $    0.4444

** Note:  This total reflects the charges for this process only,
          subprocesses created during this session are accounted for
          separately
Enter selection:X

INVALID SELECTION!  ^
NO CARRIER
```

REFERENCE # 7

THURSDAY, APRIL 26, 1990. THE MIAMI HERALD

Road plan saves tortoise habitat

By CURTIS MORGAN
Herald Staff Writer

A yearlong debate over a Fort Lauderdale Executive Airport road that threatened a gopher tortoise haven all but ended Wednesday in a compromise as rare as the creature itself.

The solution pleased all sides — environmentalists and business people.

An access road that would have skirted the border of a 15.2-acre ridge of white sand covered with rare rosemary scrub providing a home to lizards, rodents and turtles can be rerouted, airport manager William Crouch Jr. told the Broward County Urban Wilderness Advisory Board on Wednesday night.

Elated board members, who had argued that the original road would have chewed up dunes and grasses that nourish the preserve's

PLEASE SEE GOPHER, 18R

TURTLE TIDBITS

The gopher tortoise is a land turtle that can live to be 40 years old and grow as long as 14 inches. It is classified by Florida as a "species of special concern." It lives in deep underground sand burrows, which house three dozen species of animals, including the rare Florida gopher frog, the Florida mouse, the threatened Eastern indigo snake, the Florida pine snake and three kinds of beetles.

Other rare species on the site:

- The Florida scrub lizard, a rare reptile with iridescent blue belly scales.
- The large-flowered rosemary, a member of the mint family.
- Curtiss' milkweed, a threatened flowering perennial with leaves that resemble oak leaves.
- Bromeliads, scrub palmetto, spike moss and a variety of lichens.

Compromise road plan saves habitat of turtles

GOPHER, FROM 1BR

turtles, endorsed the design.

"You're talking about the environmental community and government and the private sector getting together to work out a solution," said David Utley, the board's vice chairman.

Airport authorities want the road to lead from Cypress Creek Road to an operations center, cargo gates and U.S. Customs Service office that will be built on the airport's north side. It also would improve access for emergency vehicles.

The road would have run about 600 feet north of the east-west runway, behind the Allied Signal Aerospace complex parallel to Cypress Creek Road. Under the original design, a section would have reached 50 feet into the preserve.

In May, over environmentalists' objections, the Fort Lauderdale City Commission approved the route but asked airport officials to continue to seek a compromise.

It came when Allied Signal agreed to allow the road to be built farther east in six acres it plans to develop. City engineers and airport staffers drew up a new design that actually will expand the turtle territory.

REFERENCE # 8

Official Lists of

Endangered and Potentially

Endangered Fauna and Flora in Florida

1 July 1988

FLORIDA GAME AND FRESH WATER FISH COMMISSION

Compiled by Don A. Wood, Endangered Species Coordinator

Florida Game and Fresh Water Fish Commission

Scientific Name(s)	Common Name	Designated status[1]			
		FGFWFC[2]	FDA[3]	USFWS[4]	CITES[5]
	VERTEBRATES				
Fish					
Acipenser brevirostrum	Shortnose sturgeon	E		E	I
Acipenser oxyrhynchus	Atlantic sturgeon	SSC		UR2	II
Ammocrypta asprella	Crystal darter	T		UR2	
Centropomus undecimalis	Common snook	SSC			
Cyprinodon variegatus hubbsi	Lake Eustis pupfish	SSC			
Etheostoma histrio	Harlequin darter	SSC			
Etheostoma okaloosae	Okaloosa darter	E		E	
Etheostoma olmstedi maculaticeps	Southern tessellated darter	SSC			
Fundulus jenkinsi	Saltmarsh topminnow	SSC			
Menidia conchorum	Key silverside	T			
Micropterus notius	Suwannee bass	SSC			
Micropterus sp. (undescribed)	Shoal bass	SSC			
Notropis callitaenia	Bluestripe shiner	SSC		UR2	
Notropis sp. (undescribed)	Blackmouth shiner	E		UR2	
Rivulus marmoratus	Rivulus	SSC			
Starksia starcki	Key blenny	SSC			
Amphibians and Reptiles					
Alligator mississippiensis	American alligator	SSC		T(S/A)	II
Ambystoma cingulatum	Flatwoods salamander			UR2	
Caretta caretta caretta	Atlantic loggerhead turtle	T		T	I
Chelonia mydas mydas	Atlantic green turtle	E		E	I
Chrysemys (=Pseudemys) concinna suwanniensis	Suwannee cooter	SSC		UR5	
Crocodylus acutus	American crocodile	E		E	I
Dermochelys coriacea	Leatherback turtle	E		E	I
Diadophis punctatus acricus	Big Pine Key ringneck snake	T		UR2	
Drymarchon corais couperi	Eastern indigo snake	T		T	
Elaphe guttata guttata	Red rat snake	SSC*			
Eretmochelys imbricata imbricata	Atlantic hawksbill turtle	E		E	I
Eumeces egregius egregius	Florida Keys mole skink	SSC		UR2	
Eumeces egregius lividus	Blue-tailed mole skink	T		T	
Gopherus polyphemus	Gopher tortoise	SSC		UR2	
Graptemys barbouri	Barbour's map turtle	SSC		UR2	
Haideotriton wallacei	Georgia blind salamander	SSC		UR2	
Hyla andersonii	Pine Barrens treefrog	SSC			
Kinosternon bauri	Striped mud turtle	E*		UR2	
Lepidochelys kempi	Atlantic ridley turtle	E		E	I
Macroclemys temmincki	Alligator snapping turtle	SSC		UR2	
Neoseps reynoldsi	Sand skink	T		T	
Nerodia fasciata taeniata	Atlantic salt marsh water snake	T		T	
Pituophis melanoleucus mugitus	Florida pine snake	SSC		UR2	
Pseudobranchus striatus lustricolus	Gulf hammock dwarf siren			UR2	
Rana areolata	Gopher frog	SSC		UR2	
Rana okaloosae	Bog frog	SSC			
Sceloporus woodi	Florida scrub lizard			UR2	
Stilosoma extenuatum	Short-tailed snake	T		UR2	
Storeria dekayi victa	Florida brown snake	T*			
Tantilla oolitica	Miami black-headed snake; rimrock crowned snake	T		UR2	
Thamnophis sauritus sackeni	Florida ribbon snake	T*			

*Applicable in lower Florida Keys only

Scientific Name(s)	Common Name	FGFWFC	FDA	USFWS	CITES
Birds					
Aimophila aestivalis	Bachman's sparrow			UR2	
Ajaia ajaja	Roseate spoonbill	SSC			
Ammodramus maritimus juncicolus	Wakulla seaside sparrow	SSC		UR2	
Ammodramus maritimus mirabilis	Cape Sable seaside sparrow	E		E	
Ammodramus maritimus nigrescens	Dusky seaside sparrow	E		E	
Ammodramus maritimus pelonotus	Smyrna seaside sparrow			UR2	
Ammodramus maritimus peninsulae	Scott's seaside sparrow	SSC			
Ammodramus savannarum floridanus	Florida grasshopper sparrow	E		E	
Aphelocoma coerulescens coerulescens	Florida scrub jay	T		T	
Aramus guarauna	Limpkin	SSC			

' and Endangered Biota of Florida
Peter C. H. Pritchard, SERIES EDITOR

REFERENCE # 9

Volume Five

PLANTS

Edited by Daniel B. Ward

Chairman, Special Committee on Plants
FLORIDA COMMITTEE ON RARE AND ENDANGERED PLANTS AND ANIMALS

Sponsored by the FLORIDA AUDUBON SOCIETY and FLORIDA DEFENDERS OF THE ENVIRONMENT in cooperation with the STATE OF FLORIDA GAME AND FRESH WATER FISH COMMISSION

Published for the FLORIDA COOPERATIVE EXTENSION SERVICE, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, UNIVERSITY OF FLORIDA

UNIVERSITY PRESSES OF FLORID
FAMU / FAU / FIU / FSU / UCF / UF / UNF / USF UW

Rare and Endangered Biota of Florida

Peter C. H. Pritchard, SERIES EDITOR

Volume Five

PLANTS

Edited by Daniel B. Ward

Chairman, Special Committee on Plants

FLORIDA COMMITTEE ON RARE AND ENDANGERED PLANTS AND ANIMALS

Sponsored by the

FLORIDA AUDUBON SOCIETY

and

FLORIDA DEFENDERS OF THE ENVIRONMENT

in cooperation with the

STATE OF FLORIDA GAME AND FRESH WATER FISH COMMISSION

Funding provided by

THE U. S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE

Published for the

FLORIDA COOPERATIVE EXTENSION SERVICE, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, UNIVERSITY OF FLORIDA

by

UNIVERSITY PRESSES OF FLORIDA

FAMU/FAU/FIU/FSU/UCF/UF/UNF/USF/UWF Gainesville

(1978)

Table 1. Distribution of listed plants by county. E = listed as Endangered. T = listed as Threatened. R = listed as Rare. ? = uncertainty: part or all of the county is shown as occurring within the range, but no specific county records are known, or the species is believed to be no longer present in the county.

ALACHUA

Adiantum capillus-veneris (R)
Asplenium pumilum (E)
Blechnum occidentale (E)
Brickellia cordifolia (R)
Callirhoe papaver (T)
Cheilanthes microphylla (R)
? *Litsea aestivalis* (R)
Malaxis unifolia (R)
Peltandra sagittifolia (R)
Polygonum meisnerianum (R)
Rhapidophyllum hystrix (T)
Smilax smallii (T)
Zamia floridana (T)

BAKER

Harturightia floridana (R)
Linum westii (R)
? *Peltandra sagittifolia* (R)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

BAY

? *Adiantum capillus-veneris* (R)
Drosera intermedia (R)
Gentiana pennelliana (T)
Hedeoma graveolens (T)
Hypericum lissophloeus (E)
Lupinus westianus (T)
Macbridea alba (E)
Oxypolis greenmanii (E)
Polygonella macrophylla (E)
Rhexia salicifolia (R)
? *Rhododendron austrinum* (T)
Sarracenia leucophylla (T)
Sarracenia rubra (R)
? *Smilax smallii* (T)
? *Stewartia malacodendron* (T)
Verbesina chapmanii (T)
Xyris longisepala (T)

BRADFORD

? *Adiantum capillus-veneris* (R)
? *Litsea aestivalis* (R)
? *Peltandra sagittifolia* (R)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

BREVARD

Asclepias curtissii (T)
Ernodea littoralis (T)
Mallotonia gnaphalodes (T)

BREVARD (Cont.)

? *Monotropsis reynoldsiae* (E)
Nemastylis floridana (T)
? *Nolina atopocarpa* (E)
Ophioglossum palmatum (E)
Rhapidophyllum hystrix (T)
Zamia umbrosa (T)

BROWARD

Asplenium dentatum (T)
Asplenium serratum (E)
Coccothrinax argentata (T)
Commelina gigas (T)
Drosera intermedia (R)
Ernodea littoralis (T)
? *Gossypium hirsutum* (E)
Jacquemontia reclinata (E)
Mallotonia gnaphalodes (T)
Nemastylis floridana (T)
Okenia hypogaea (E)
Ophioglossum palmatum (E)
Pleopeltis revoluta (E)
Polygala smallii (E)
? *Remirea maritima* (E)
Tillandsia flexuosa (T)
Zamia floridana (T)

CALHOUN

Adiantum capillus-veneris (R)
Baptisia megacarpa (E)
? *Bumelia lycioides* (R)
Cornus alternifolia (E)
Drosera intermedia (R)
Gentiana pennelliana (T)
Kalmia latifolia (R)
Linum westii (R)
Oxypolis greenmanii (E)
Rhododendron austrinum (T)
Sarracenia leucophylla (T)
Smilax smallii (T)
Stewartia malacodendron (T)

CHARLOTTE

? *Asclepias curtissii* (T)
? *Ernodea littoralis* (T)
? *Gossypium hirsutum* (E)
Zamia floridana (T)

CITRUS

Adiantum capillus-veneris (R)
Anemone berlandieri (R)

CITRUS (Cont.)

Asplenium pumilum (E)
Cheilanthes microphylla (R)
? *Drosera intermedia* (R)
? *Peltandra sagittifolia* (R)
Rhapidophyllum hystrix (T)
Smilax smallii (T)
Zamia floridana (T)

CLAY

Asclepias curtissii (T)
Harturightia floridana (R)
Litsea aestivalis (R)
Peltandra sagittifolia (R)
Rhapidophyllum hystrix (T)
Rhododendron chapmanii (E)
Rudbeckia nitida (T)
? *Smilax smallii* (T)
Sphenostigma coelestinum (T)

COLLIER

Acrostichum aureum (R)
Asclepias curtissii (T)
Asplenium auritum (E)
Asplenium serratum (E)
Bulbophyllum pachyrhachis (E)
Burmannia flava (R)
Campylocentrum pachyrrhizum (E)
Campyloneurum angustifolium (E)
Catopsis nutans (E)
Celtis iguanaea (E)
Cereus gracilis (T)
Cheilanthes microphylla (R)
Encyclia pygmaea (E)
Epidendrum acunae (E)
Epidendrum nocturnum (T)
Ernodea littoralis (T)
? *Gossypium hirsutum* (E)
? *Guzmania monostachia* (E)
Jacquemontia curtissii (T)
Lepanthopsis melanantha (R)
Lycopodium dichotomum (E)
Maxillaria crassifolia (E)
Ophioglossum palmatum (E)
Restrepiella ophiocephala (E)
Roystonea elata (R)
Tillandsia flexuosa (T)
Tillandsia pruinosa (T)

COLUMBIA

Adiantum capillus-veneris (R)
Litsea aestivalis (R)
Peltandra sagittifolia (R)

SELECTED REFERENCES:

Small, J. K. 1938. Ferns of the Southeastern States. Lancaster, Pa. 517 pp.

PREPARED BY: Daniel B. Ward and Robert K. Godfrey.

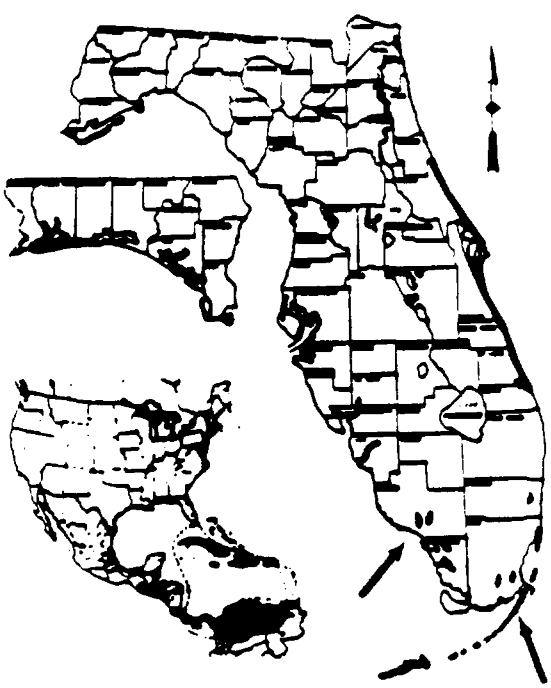
Endangered
BIRD'S-NEST SPLEENWORT

Asplenium serratum L.
Polypodiaceae
Filicinae

OTHER NAMES: New World Bird's-nest Fern.

DESCRIPTION: The Bird's-nest Spleenwort is a fern with an upright rootstock surmounted by a vase-shaped rosette of leaves, suggesting the form of a bird's nest. Each leaf is oblanceolate, undivided, with the margin rather evenly toothed. On large plants the leaves may be up to 70 or 80 cm long. From the midrib a multitude of straight, closely spaced veins run almost directly to the margin, each ending in a separate tooth. The sori are linear and lie directly on the surface of the veins but do not extend fully to the margins.

RANGE: This is a tropical fern, widespread in the West Indies and Central and South America. In Florida it is probably found at present only in Monroe, Dade, Broward, and Collier counties. Specimens collected in April 1877 by A. P. Garber, the discoverer of this species in the United States, were recorded as having been obtained at Miami; possibly his location was Matheson Hammock, where the species was formerly abundant. Correll (1938) has cited specimens from Lee and Volusia counties, areas from which it has long been extirpated.



Bird's-nest Spleenwort (*Asplenium serratum*)

HABITAT: The characteristic sites of this fern are on fallen logs, on stumps, or near the bases of tree trunks in the deep swamps of the Fakahatchee Slough, in the Deep Lake cypress strand, and in the somewhat drier but still dark and moist tropical hammocks.

SPECIALIZED OR UNIQUE CHARACTERISTICS: The genus *Asplenium* is a large one, and most species have pinnate or even bipinnate leaves. The Bird's-nest Spleenwort stands out because of its undivided leaves with the many parallel veins, but in other characteristics it is typical of the genus.

BASIS OF STATUS CLASSIFICATION: This plant has horticultural appeal and has become a target of the hordes of amateur and even commercial collectors, who gather it for greenhouse and patio ornamentation. The Matheson Hammock station, where Small (1921) said there was more of this fern than in all the other South Florida hammocks together, is now largely depleted by this rapacious collecting. The surviving stations are largely protected by distance and inaccessibility.

RECOMMENDATIONS: This fern is presently given token protection, as are most ferns, by its inclusion (even though not specifically listed) in the Preservation of Native Flora Law. Since it is a particularly attractive plant for greenhouse cultivation, however, it is regularly taken from the wild by horticulturists. This collecting, more than habitat destruction, has now made it a very rare plant. Matheson Hammock, presently owned and protected by Dade County, still retains a few plants and, if closer control of collection cannot be established in the Collier County cypress swamps, will soon be the only surviving station for the species in the United States.

SELECTED REFERENCES:

Correll, D. S. 1938. A county check-list of Florida ferns and fern allies. Amer. Fern Jour. 28:11–16, 46–54, 91–100.

Small, J. K. 1921. Historic trails, by land and by water. Jour. N.Y. Bot. Gard. 22:193–222.

PREPARED BY: Daniel B. Ward.

Endangered
APALACHICOLA WILD-INDIGO

Baptisia megacarpa Chapm.
Leguminosae
Dicotyledoneae

DESCRIPTION: The Apalachicola Wild-indigo is a perennial herb, to about 8–10 dm tall. The stems are spar-

RANGE: The Burrowing Four-o'clock is known in Florida only from a few locations along the lower east coast. Elsewhere it is found only along the Gulf Coast of Mexico, from Veracruz to Yucatan.

HABITAT: The habitat of this plant is restricted to the ocean side of the coastal dunes. It is often the closest plant to the water's edge.

SPECIALIZED OR UNIQUE CHARACTERISTICS: This plant is almost unique in that it buries its developing fruit beneath the soil as does the Peanut (*Arachis hypogaea*). The specific epithet for both of these plants is derived from words meaning "beneath the ground." Other than for this developmental trait, the two plants are not related. The subterranean fruit ensures that the seeds are well placed in a suitable habitat for germination and growth, but at the same time inhibits the ease with which this plant is distributed.

BASIS OF STATUS CLASSIFICATION: J. K. Small and J. J. Carter discovered *Okenia hypogaea* in 1903 on the sand dunes opposite Miami, a site now wholly destroyed by hotel construction. Small later (1919) reported that it extended from Soldier Key, north to Baker's Haulover, Dade County. It was then found farther north, to Juno Beach, northern Palm Beach County. Most of the stations once known along this coast have been obliterated by construction and by dune removal, and increasing recreational use of beach areas imperils even those plants in state-owned parks.

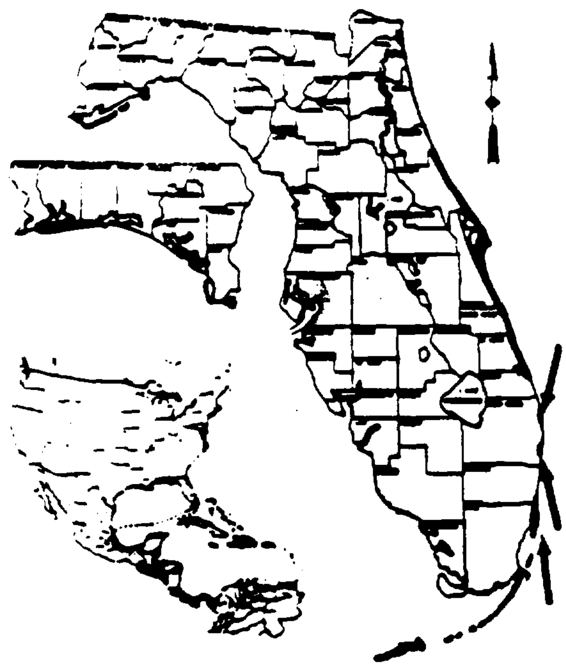
Fig. 27. Burrowing Four-o'clock (*Okenia hypogaea*): Flowering branch X 2/3; habit X 1/8.

RECOMMENDATIONS: All possible remaining areas of beach dunes on which the Burrowing Four-o'clock occurs should be protected from development. Those areas in state parks should be protected by steps to guide public pathways and heavy usage away from the dunes where this plant grows.

SELECTED REFERENCES:

Small, J. K. 1919. *Okenia hypogaea*. Addisonia 4:11–12.

PREPARED BY: Daniel B. Ward.



Burrowing Four-o'clock (*Okenia hypogaea*)

Endangered
HAND FERN

***Ophioglossum palmatum* L.**
Ophioglossaceae
Filicinae

OTHER NAMES:
Scientific synonym: *Cheiroglossa palmata* (L.) Presl

DESCRIPTION: The Hand Fern is not readily recognized by the novice as belonging to that plant group. It consists of a scaly, globose rhizome from which hang usually 2 or 3 pendent leaves, each consisting of a fleshy but flat "hand"-shaped blade. These leaves may have anywhere from 2 to 6 or 7 elongate, usually sharp-tipped lobes, the "fingers." The leaf with its long petiole may droop 40 cm below the attachment of the rhizome. The spore-bearing structures are attached near the juncture of the blade with its petiole;

these are narrowly oblong, 1–6 in number, and 3–5 cm long.

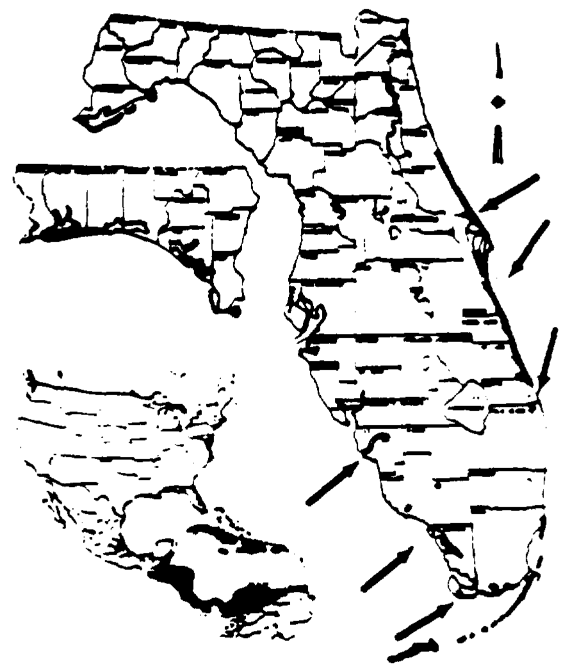
RANGE: This is a tropical fern, once found throughout the West Indies and the tropical portions of Central and South America. In Florida it once was locally common in the southern part of the peninsula and extended north to Manatee County on the West Coast and Seminole and Orange counties in the east. It is now found only in a few low hammocks.

HABITAT: The almost exclusive habitat of this fern is the detritus-filled base or "boot" of Cabbage Palm trees (*Sabal palmetto*) in low, moist, and very shaded hammocks. As the leaves sequentially die, decay, and fall from the trunk, a process that takes a number of years, the Hand Ferns germinate, thrive, and then, with the boot, fall to the ground where they too die.

SPECIALIZED OR UNIQUE CHARACTERISTICS: The form of this plant, with its hand-shaped, pendent leaves, is like no other in Florida.

BASIS OF STATUS CLASSIFICATION: The range of this bizarre plant has dwindled under the twin assaults of drainage and fire and of the rapacious enthusiasm of collectors. In 1938 J. K. Small wrote: "The plants are very sensitive to fire, and since forest-fires and prairie-fires are becoming more frequent in districts where they formerly were rare, this fern is fast disappearing from localities where it once was abundant. So destructive have been the fires that in many localities where comparatively few years ago the Hand Fern could be gathered literally by the wagon load it is now extinct. The few stations now known to fern students are guarded with great secrecy."

The three and a half decades that have passed since Small's statement have carried the Hand Fern very much closer to the point of its total disappearance from Florida. The vastly increased population of South Florida, with the more-than-proportional increase in the number of persons interested in collecting and raising our rarer native plants, has meant the destruction of the last remnant of this fern from areas where, even when Small wrote, it was still common. In a single documented example—when the trail through Mahogany Hammock in the Everglades National Park was opened in April 1960—three trees in the hammock were known to bear Hand Fern; by June of that year there was none.



Hand Fern (*Ophioglossum palmatum*)

Fig. 28. Hand Fern (*Ophioglossum palmatum*): Fertile lobe X 3/2; habit X 1/2.

RECOMMENDATIONS: The habitat in which the Hand Fern once grew is not yet absent from South Florida, for it is often poorly drained and ill adapted to development. But those places where this fern still occurs must be protected from fire and increasingly from the depredations of collectors. Without effective restrictions to its collection, the Hand Fern will not long persist in Florida.

SELECTED REFERENCES:

Mesler, M. R. 1974. The natural history of *Ophioglossum palmatum* in South Florida. Amer. Fern Jour. 64:33–39.

SELECTED REFERENCES:

Harper, R. M. 1930. A preliminary list of the endemic flowering plants of Florida. Quart. Jour. Fla. Acad. Sci. 12:1–19.

Ward, D. B. 1963. Southern limit of *Chamaecyparis thyoides*. Rhodora 65:359–363.

Wherry, E. T. 1936. The ranges of our eastern Parnassias and Sedums. Bartonia 17:17–20.

PREPARED BY: Daniel B. Ward.

Endangered
EVERGLADES PEPEROMIA

Peperomia floridana Small
Piperaceae
Dicotyledoneae

OTHER NAMES:
Scientific synonym: *Rhynchophorum floridanum* (Small) Small

DESCRIPTION: The Everglades Peperomia is an epiphyte. The stems are stout, with the branches elongated and often vine-like. The leaves are ovate to orbicular, 5–10 cm long, and narrowed to a short petiole. The inflorescence is a short-stalked spike usually 6–10 cm long, with the rachis up to 5 mm thick.

RANGE: This species is endemic to South Florida, mostly or perhaps entirely in Dade County.

HABITAT: The plant is epiphytic, mainly on the trunks of oak trees in hammocks.

SPECIALIZED OR UNIQUE CHARACTERISTICS: This is one of the two species of Florida *Peperomia* that are epiphytic. The other, *Peperomia obtusifolia* (L.) Dietr., is usually restricted to decaying bark of logs and stumps and is seldom found far above the ground. The Everglades Peperomia prefers the sound bark of living wood and often occurs far above the ground in the upper branches of the trees. It is unusually attractive growing in combination with ferns, orchids, and bromeliads.

BASIS OF STATUS CLASSIFICATION: In 1908 J. K. Small described this plant as apparent "upon entering any hammock of the Everglades Keys." Now only a few surviving hammocks contain plants of this species.

RECOMMENDATIONS: This plant may be preserved only by protection of the few surviving hammocks where it is still to be found.

SELECTED REFERENCES:

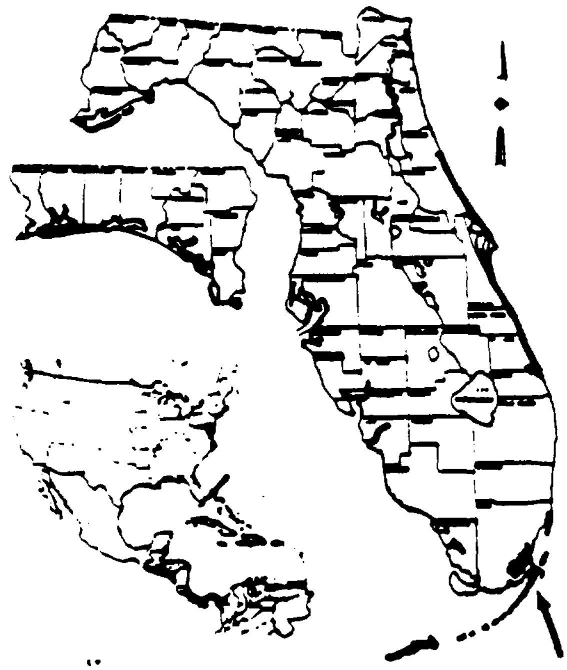
Long, R. W. and O. Lakela. 1971. A Flora of Tropical Florida. Univ. of Miami Press. Coral Gables, Fla. 962 pp.

Small, J. K. 1908. An additional species of *Peperomia* from Florida. Torreya 26:109–110.

Small, J. K. 1931. The wild pepper-plants of continental United States. Jour. N.Y. Bot. Gard. 32:210–223.

Small, J. K. 1933. Manual of the Southeastern Flora. N.Y. 1554 pp.

PREPARED BY: John Popenoe.



Everglades Peperomia (*Peperomia floridana*)

Endangered
STAR-SCALE FERN

Pleopeltis revoluta (Spreng. ex Willd.) A. R. Smith
Polypodiaceae
Filicinae

OTHER NAMES:
Scientific synonyms: *Pleopeltis astrolepis* (Liebm.) Fourn.; *Polypodium astrolepis* Liebm.

DESCRIPTION: Star-scale Fern is a small epiphytic fern. Its rhizome is a dark brown, slender strand, about 2 mm in diameter, creeping and branching extensively on its host tree. The rhizome is covered with long, dense, rusty brown hairs that almost conceal small, blackish scales. The fronds are scattered, with very short stipes that are quickly margined and broaden into a linear or lance-linear blade from 6 to 15 cm long and 5 to 15 mm broad. On the lower leaf surface, on either side of the midrib, is a single row of circular or, more generally, oblong sori. Protruding among the sporangia of the sorus are special protective hairs, or paraphyses, which expand into multi-rayed, star-like, peltate discs (whence the common name) that very quickly become detached from the maturing sorus.

RANGE: This is a plant of the lands bordering the Caribbean. It extends from tropical South America to southern Mexico and to the Antilles. A single station has recently been discovered in northeastern Broward County, Florida.

HABITAT: Star-scale Fern is an epiphyte, with rhizomes that creep over the trunks and branches of trees in tropical hammocks. The Florida collections have been obtained from the limbs of Pond-apple (*Annona glabra*).

SPECIALIZED OR UNIQUE CHARACTERISTICS: This fern is a tropical epiphyte, one of the species that demonstrates the floristic ties of Florida with the New World tropics.

BASIS OF STATUS CLASSIFICATION: Only a very few plants of this species are known in Florida, from a very small area. Because of its rarity, it is now sought by collectors who wish it for cultivation as well as for scientific specimens. The location in which it grows is threatened by drainage and residential development.

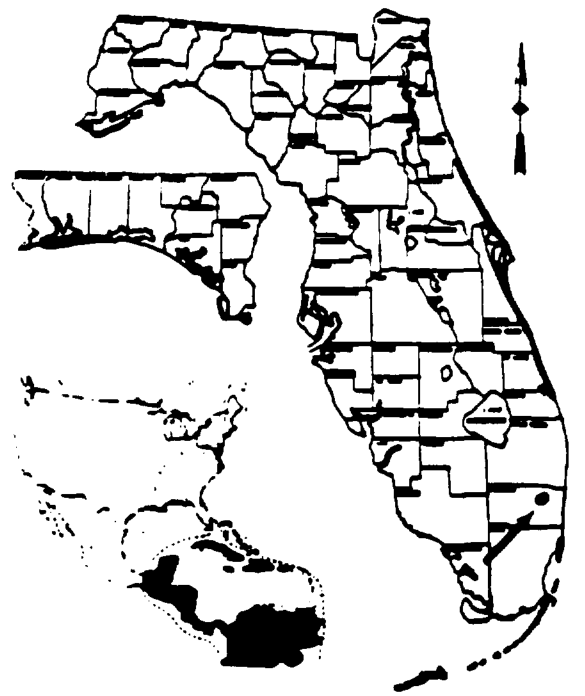
Fig. 32. Star-scale Fern (*Pleopeltis revoluta*): Habit X 1/3; underside of fertile frond X 2/3; peltate scale X 15.

RECOMMENDATIONS: Habitat preservation, by restrictions against further drainage and development, is essential if this fern is to survive in the state. Even beyond habitat preservation, the species must be guarded against collection by those attracted by its rarity.

SELECTED REFERENCES:

Howard, R. A. 1977. Flora of the Lesser Antilles, Vol. 2, Pteridophyta. By C. R. Proctor. Arnold Arboretum, Jamaica Plain, Mass. 414 pp.

PREPARED BY: Daniel B. Ward.



Star-scale Fern (*Pleopeltis revoluta*)

Endangered
LEWTON'S POLYGALA

***Polygala lewtonii* Small**
Polygalaceae
Dicotyledoneae

DESCRIPTION: Lewton's Polygala is a perennial, with a small taproot and a crown from which grow annually 1 to several stems that spread and then curve erect. At the tallest they are about 20 cm. The leaves are small and spatulate and are scattered alternately along the lower half of the stem, with several smaller leaves appearing in the axil of each larger one. The normally opening flowers, on the upper third of the stem, are an attractive purplish-red. Each flower is no more than 4 mm long and has as its most conspicuous feature 2 enlarged and wing-like sepals, between which the largest petal forms a keel that ends in a minute tuft of finger-like projections. The fruit is a small, oblong capsule, partly enclosed by the 2 persistent, enlarged sepals.

Lewton's Polygala is closely related to two other species, *P. crenata* and *P. polygama*. This group is character-

NUS CORPORATION AND S

TELECON NOTE

CONTROL NO.	**DATE:** May 3, 1990	**TIME:** 11:40 AM

DISTRIBUTION:

Broward County Project Managers

BETWEEN: Paddy Cunningham	**OF:** Fern Forest Nature Center	**PHONE:** (305) 970-0150

AND: William E. Vasser, NUS Corporation

DISCUSSION:

Fern Forest Nature Center is a 254-acre regional park. It is home to 32 species of ferns, including the Hand adder's tounge fern (Ophioglossum palmatum), a state-designated endangered species. Also, the threatened (federal designation) Eastern Indigo snake may be found in the park.

The park is located in the Margate Estates area, northwest of F.L.E.A.

REFERENCE # 11

SOIL SURVEY OF

Broward County Area, Florida

United States Department of Agriculture
Soil Conservation Service
In cooperation with
University of Florida
Institute of Food and Agricultural Sciences
Agricultural Experiment Stations
Soil Science Department

Contents

Issued July 1976

SOIL SURVEY OF BROWARD COUNTY AREA, FLORIDA

BY ROBERT F. PENDLETON, HERSHEL D. DOLLAR, AND LLOYD LAW, JR., SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UNIVERSITY OF FLORIDA, INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, AGRICULTURAL EXPERIMENT STATIONS, SOIL SCIENCE DEPARTMENT

BROWARD COUNTY AREA is in Broward County and the southeastern part of Florida (fig. 1). It

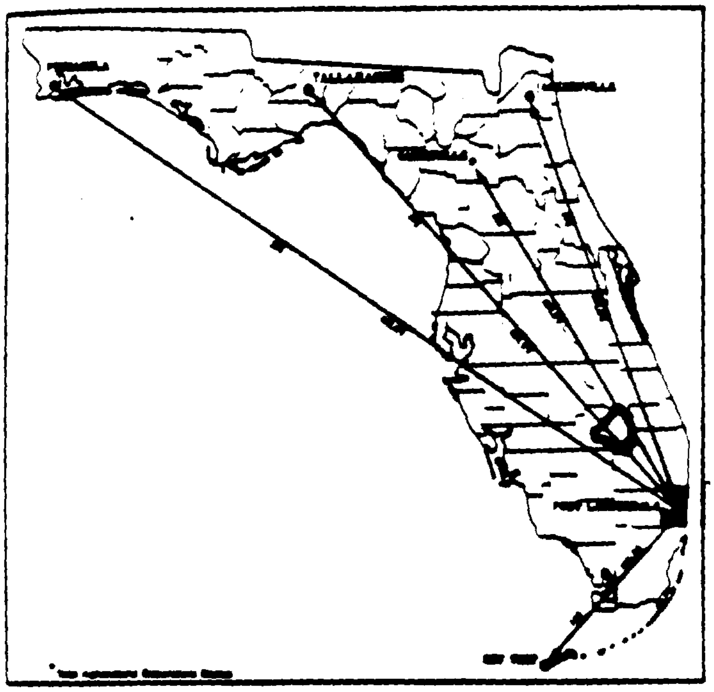


Figure 1.—Location of Broward County Area in Florida.

has a total land area of 189,273 acres or about 296 square miles. Fort Lauderdale is the county seat of Broward County. The survey area is bounded by Dade County on the south, a conservation area on the west, Palm Beach County on the north, and an area defined along Range line 42–43E to Atlantic Boulevard, west on Atlantic Boulevard to Powerline Road, south on Powerline Road to Oakland Park Boulevard, west on Oakland Park Boulevard to Sunshine Parkway, and south on the Sunshine Parkway to the Dade County line.

Most of the survey area is low, nearly level land at an elevation of 2 to 10 feet above sea level. Two sand ridges are in the area. One is a coastal ridge that extends from Palm Beach County and ends south of Pompano. The other is known as Pine Island and is west of Davie and north of Cooper City. This ridge consists of only about 400 acres but is at the highest elevation, 29 feet, in the Area. The average temperature is 75.4° F. Rainfall is abundant, but is unevenly distributed.

The county had a population of 620,000 people in 1970.[1] Almost all of the people live east of the conservation area.

Generally, farm activity has diminished, but some citrus crops, winter truck crops, and cattle are produced.

The Area is very popular with tourists and retired persons because of the warm climate in winter and the various available recreational facilities.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the Broward County Area, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different textures in the surfa

[1] This figure is taken from statistical data of the U.S. Department of Commerce, Bureau of the Census.

cation exchange capacity and then multiplying by 100.

Organic matter was determined by a modification of the Walkley-Black wet-combustion method as outlined in procedure 6A1a. Total nitrogen was obtained by the semi-micro Kjeldahl method as shown in procedure 6B2a. Resistivity (ohm cm) or an "R" value was obtained using a Model 100 Corrosion Tester. The corrosion potential or a "C" value that was obtained from the manufacturer's tables is directly related to the "R" value. The smaller the "C" value, the less the corrosion and the greater the expectancy of pipe life. Generally, C values range from 1 to 10, and pipe life ranges accordingly from 20 to 2 years.

Bulk density, hydraulic conductivity (saturated), and water retention at 0.10 and 0.33 bar were measured on 3 by 5.4 centimeter cylindrical (undisturbed) soil cores. Water retention at 15-bar suction was determined on disturbed or loose soil samples by procedure 4B2.

Water retention difference was calculated using the formula

$$\text{WRD (in in)} = \frac{\frac{1}{3} - (\text{or } \frac{1}{10})\ \text{bar}\ \% - 15 - \text{bar}\ \%}{100}$$

x bulk density, moist. $\frac{1}{10}$ bar was used for sandy soils and $\frac{1}{3}$ bar for organic soils. Water retention difference is considered by many to closely approximate available water capacity.

Additional Facts About the Area

Soil is intimately associated with its environment. The interaction of all factors determines the overall behavior of a soil for a given use. This section discusses briefly the major factors of the environment other than those that affect the use and management of soils. The factors discussed are climate; transportation, markets, and farming; water supply and natural resources; and physiography and drainage.

Climate[10]

The climate of Broward County is characterized by long, warm, humid summers and mild winters. The moderating influence of the waters of the Atlantic on maximum temperatures in summer and minimum temperatures in winter is quite strong along the immediate coast but diminishes noticeably a few miles inland. The moderation of the coastal winter temperatures gives this section of the survey area a tropical climate (temperatures of coldest month higher than 64.4° F), while the rest is designated as humid subtropical.

Rainfall also has a much greater variation in an east-west direction than it has in a north-south direction. Precipitation occurs during all seasons but on the basis of mean monthly totals of precipitation, a rainy season of 5 months from June through October brings nearly 65 percent of the annual rainfall and a relatively dry season of 5 months from November through March produces only about 20 percent of the annual total. Average annual rainfall totals range from 60 inches along the coastal sections to nearly 64 inches a few miles inland, and then diminish to 50 inches along the western border of Broward County.

Most summer rainfall comes from showers and thunderstorms of short duration. They are sometimes heavy, with 2 or 3 inches of rain falling within a period of 1 to 2 hours. Day-long rains in summer are rare. When they occur, they are almost always associated with tropical storms. Winter and spring rains are not generally so intense as summer thundershowers. A 24-hour rainfall of almost 9 inches may be expected to occur sometime during the year in about 1 year in 10 on the average.

Hail falls occasionally in thunderstorms but the hailstones are generally small and seldom cause much damage. Fourteen tornadoes were reported in Broward County during the 12-year period 1959–71.

Temperature and precipitation data for the period 1962–71 are shown in table 17. The data recorded at the Fort Lauderdale Experiment Station are representative of weather conditions in the eastern section of Broward County, but away from the immediate influences of the Atlantic. Table 18 gives a comparison with other weather stations within Broward County. The Experiment Station is located 5 miles southwest of the Fort Lauderdale Post Office, while the Dixie Water Plant is within the city limits, 2 miles southwest of the Post Office. The Bahia Mar observations are taken at the Yacht Club on the ocean, 3 miles east of the Post Office. North New River Canal No. 2 is a weather station that collects rainfall data only. It is located on the northern border of the county, centered midway between its eastern and western boundaries.

Summer temperatures have few day-to-day variations, and temperatures as high as 98° F. are rare. In 45 years of record at the Dixie Water Plant, only one reading of 100° has been recorded. Twenty years of observation show a record high of 98° at the Experiment Station and 96° at Bahia Mar.

Winter minimum temperatures have considerable day-to-day variations due largely to periodic invasions of cold, dry air that has moved southward from Canada. At the Experiment Station, temperatures of 32° or below have been observed on only 11 days during the past 10 years. In 3 of the 10 years, no freezing temperatures have been observed. Data from station run by the Federal-State Frost Warning Service show that in the 30-year period 1937–67, there were 2 nights on which the temperatures reached 32° or below the coast, and 75 nights inland along the western edge of Broward County. Calculations show that in the same period there were 100 hours with temperatures of 32 or below along the coast, increasing to 300 hours inland. The lowest temperature reported in the Fort Lauderdale area during the last 45 years was 28°. Table 19 gives the record of low temperatures at Davie, a Frost Warning Station located in the interior southeastern section of Broward County. This temperature record can be considered representative of the climate for truck farming in the eastern sections of the survey area.

[10] By JAMES T. BRADLEY, climatologist for Florida, National Weather Service, U.S. Department of Commerce. For convenience in presentation this section includes climate data for all of Broward County.

TABLE 19.—*Record of low temperatures*

[Period of

Temperature	Percent of seasons at or below various temperatures before—						
	November 20	December 10	December 30	January 19	February 18	March 10	March 30
°F							
36	0	23	57	87	100	100	100
32	0	13	33	57	77	83	83
28	0	0	7	17	33	33	33
26	0	0	7	7	17	17	17
24	0	0	0	0	3	3	3

Four airports are available for use—Fort Lauderdale-Hollywood International Airport, Fort Lauderdale Executive Airport, Pompano Beach Airport, and North Perry Airport. Only Fort Lauderdale International Airport has scheduled commercial airline flights. The other airports are mostly for private planes.

The largest state owned fresh-vegetable market in Florida is the Pompano State Farmers' Market. This market handles vegetables from the survey area and from the southern part of Palm Beach County. Most of the citrus is processed in other counties. More grapefruit is consumed than is produced in the county.

Not much farming was practiced in the Broward County Area before 1910. Drainage was established with the formation of the Napoleon B. Broward Drainage District. After drainage was established, citrus groves were planted between the New River and South New River Canals. Most of the winter vegetable crops were grown in the same area, but planting soon spread primarily to the north as the area was developed (*9*). According to the 1950 Census of Agriculture, approximately 700 farms and 45 dairies were in Broward County in 1950. By 1969, the number had decreased to 291 farms and 8 dairies. Farming in the Area generally is still on the decrease.

This is one of the few places in the United States that has either a tropical or humid subtropical climate. A large percentage of the soils are nearly level, poorly drained, and infertile. Another fairly large group of soils are organic and nearly level, very poorly drained, and relatively fertile. With drainage and proper fertilization, all of these soils produce excellent winter truck crops.

The coastal areas have excellent facilities for fishing and boating.

Water Supply and Natural Resources

The water supply for the cities in the Broward County Area comes primarily from municipal wells. Many private wells are used mostly for watering lawns. Because porous limestone is below most of the soils, water can move laterally for long distances. The water in the canals can be regulated to help recharge the ground water during dry periods.

Although most of the Area receives about 60 inches of rainfall annually, this amount may not be sufficient to provide water needs in the future. The main alternate source could be Lake Okeechobee to the north of the survey area.

Climate is considered one of the most important natural resources of the Area.

Physiography and Drainage

The Broward County Area can be divided into three general parts based on differences in physiography and soils.

The western part is a nearly level, generally treeless sawgrass plain that appears to be flat. The soils are organic and overlie limestone. In many places the soils are shallow. Under natural conditions, water stood on these soils for months and only during extremely dry seasons was the surface exposed. Today, these soils have been drained, and water stands on the surface for only short periods. With drainage, the organic soils are subject to oxidation and subsidence. When exposed to air, organic matter is oxidized or slowly burned up, and this gradual loss of organic matter results in subsidence or a lowering of surface elevation. Also, during dry seasons, wildfires have burned some of the organic surface soil, and decreased the thickness of the organic material.

Very little of the organic soils are presently farmed. A few acres are in improved pasture. In recent years, after some drainage, several types of trees have become established. These trees are melaleuca, Australian pine, and waxmyrtle. One method used for developing the organic soils for urban use removes the organic material and adds fill consisting of rock or sand.

The central part consists of nearly level, grassy areas interspersed with small ponds. The soils here are wet and sandy and are underlain by limestone. Before drainage, water stood on these soils for several months each year. The original vegetation was water-tolerant grasses and a few cypress stands. In the higher areas, pine and palmetto were common. These areas are now farmed, and with drainage produce excellent pasture and truck crops.

This is also an area of rapid urban development. The underlying limestone is mostly porous, and water moves through it laterally for long distances. Water-control ditches can be further apart in these soils than in soils underlain by sand or loamy material. For urban *at Davie in Broward County*

record 1937–67]

Percent of seasons at or below various temperatures after—						
November 20	December 10	December 30	January 19	February 18	March 10	March 30
100	100	100	83	50	13	[illegible]
83	80	73	50	17	3	[illegible]
37	37	30	20	3	0	[illegible]
17	17	10	17	0	0	[illegible]
3	3	3	3	0	0	[illegible]

development, fill is commonly added to raise the elevation to such a level that water does not cover the soil surface.

The eastern part is made up of low, sandy ridges, a part of which is commonly referred to as flatwoods. The vegetation is mostly pine, palmetto, and native grasses. The flatwoods part is made up of deep, poorly drained, nearly level, sandy soils. These soils have been used mostly for truck crops and pasture, but are rapidly being developed for urban uses. They require drainage, and fill is added to low areas so that the entire acreage can be developed. The other part is made up of deep, excessively drained or well-drained, sandy soils, many of which, are developed for urban uses.

The major drainage systems in the Area flow from west to east and drain into the Atlantic Ocean. These systems are the Hillsboro Canal at the Palm Beach-Broward County line, the Pompano Canal at Margate, the Midriver Canal at Lauderhill, the North New River Canal at Davie, and C-9 at the Dade County line. These canals are under the control of the Central and Southern Florida Flood Central District.

Literature Cited

(1) American Association of State Highway Officials. 1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus.

(2) Bouyoucos, G. J. 1962. Hydrometer method improved for making particle size analyses of soils. Agron. Jour. 54: 464–465.

(3) Cooke, C., Wythe. 1945. Geology of Florida. Fla. State Dept. of Conserv. and Fla. Geol. Survey, Geol. Bul. 29, 339 pp., illus.

(4) Simonson, Roy W. 1962. Soil classification in the United States. Sci. 137, 1027–1034, illus.

(5) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dept. Agr. Handb. No. 18, 503 pp., illus.

(6) ——— 1960. Soil classification, a comprehensive system. 7th approximation. 265 pp., illus. [Supplements issued in March 1967 and in September 1968]

(7) ——— 1972. Soil survey laboratory methods and procedures for collecting soil samples. Soil Survey Investigations Report No. 1 (Revised Edition).

(8) United States Department of Defense. 1968. Unified soil classification system for roads, airfields, embankments, and foundations. MIL–STD–619B, 30 pp., illus.

(9) Weidling, Philip and Burghard, August. 1966. Checkered sunshine: the story of Fort Lauderdale, 1793–1955. Gainesville, University of Florida Press, 296 pp., illus.

(10) Zelazny, L. W. and Fiskell, J. G. A. 1972. Acidic properties of some Florida soils ii. exchangeable and titratable a[illegible] Soil and Crop Science Society of Florida Proceedings [illegible] 149–154.

Glossary

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

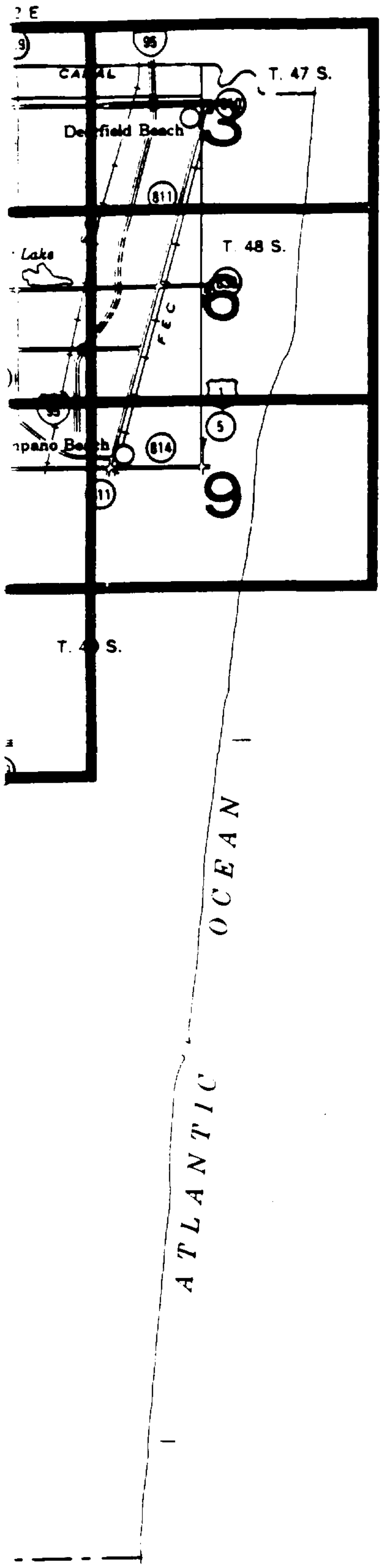
Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.



INDEX TO MAP SHEETS

BROWARD COUNTY AREA, FLORIDA

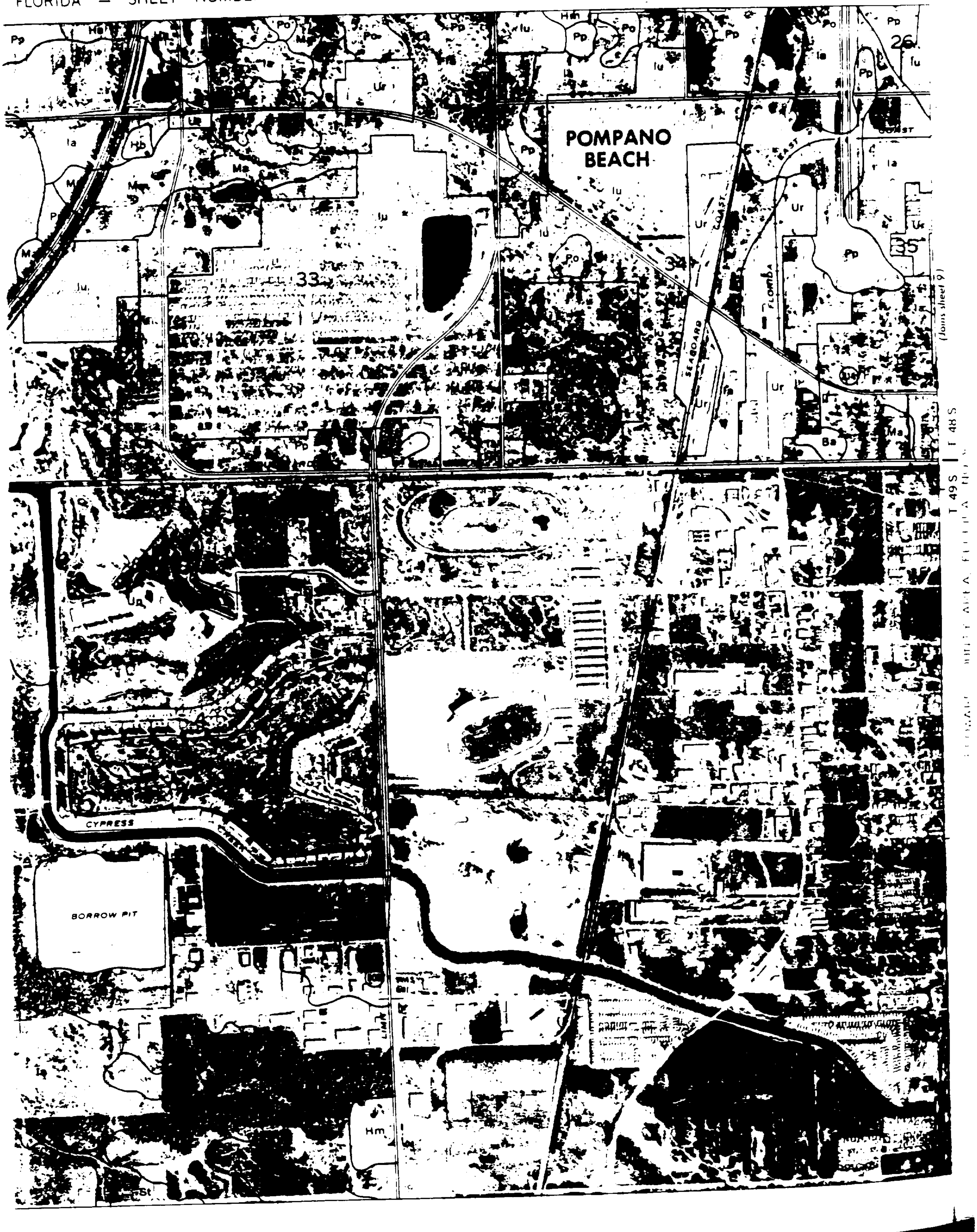
Scale 1:190,080

1 0 1 2 3 4 Miles

)ATA

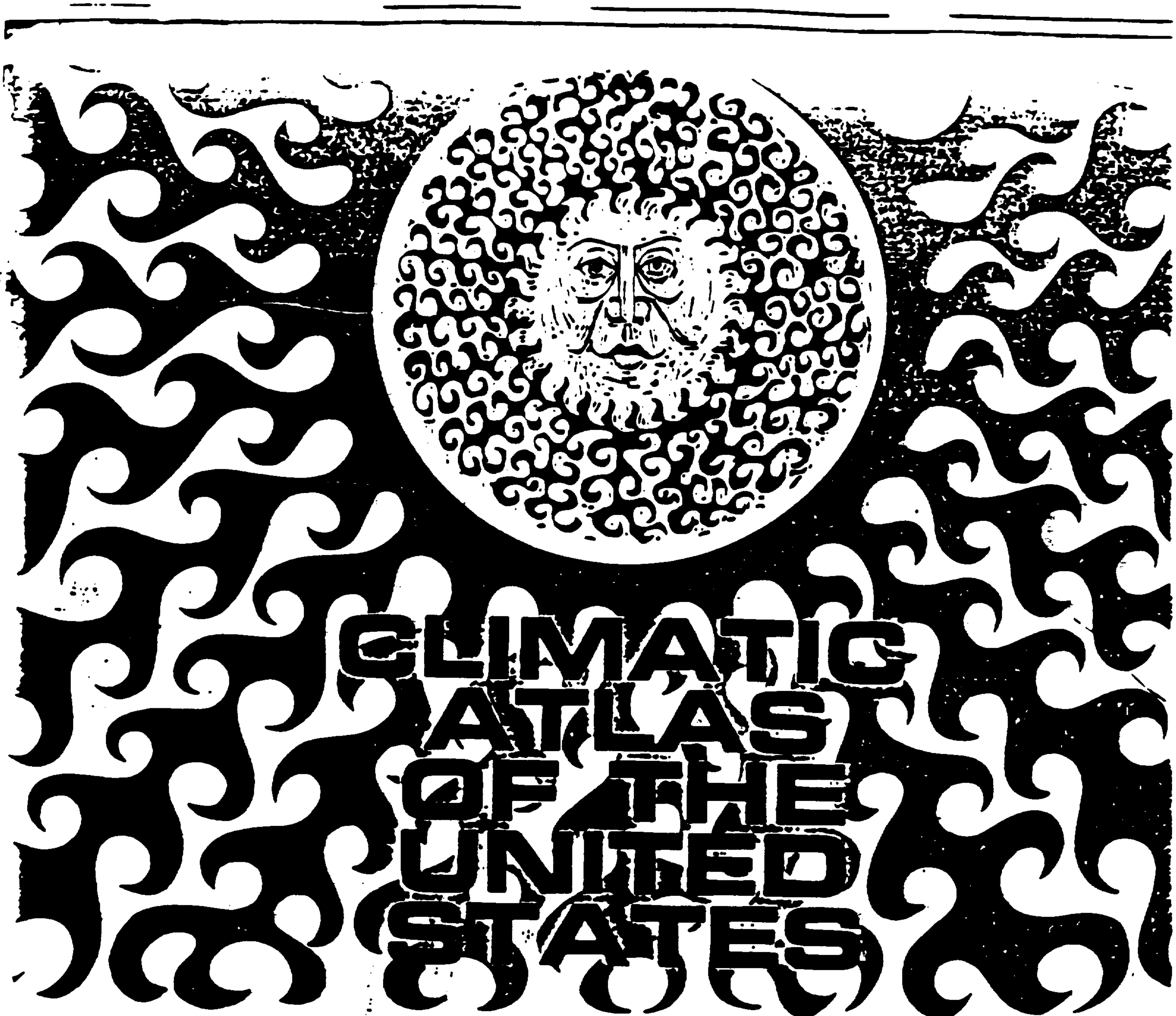
SOIL LEGEND

SYMBOL	NAME
Ba	Basinger fine sand
Bc	Boca fine sand
Da	Dania muck
Ha	Hallandale fine sand
Hb	Hallandale-Urban land complex
Hm	Hallandale and Margate soils
Ia	Immokalee fine sand
Iu	Immokalee-Urban land complex
La	Lauderhill muck
Ma	Margate fine sand
Pa	Paola fine sand
Pb	Paola-Urban land complex
Pm	Plantation muck
Po	Pomello fine sand
Pp	Pompano fine sand
Sa	Sanibel muck
St	St. Lucie fine sand
Ud	Udorthents
Un	Udorthents, shaped
Ur	Urban land



POMPANO BEACH
SEABOARD
COAST
FLORIDA
EAST
CYPRESS
BORROW PIT
33
34
35
26
Pp
Ia
Iu
Ur
Ma
Hb
Hm
Ba
Po
(Joins sheet 9)
T 48 S
T 49 S

REFERENCE # 12



?CE . Environmental Science Services Administration . Environmental Data Service

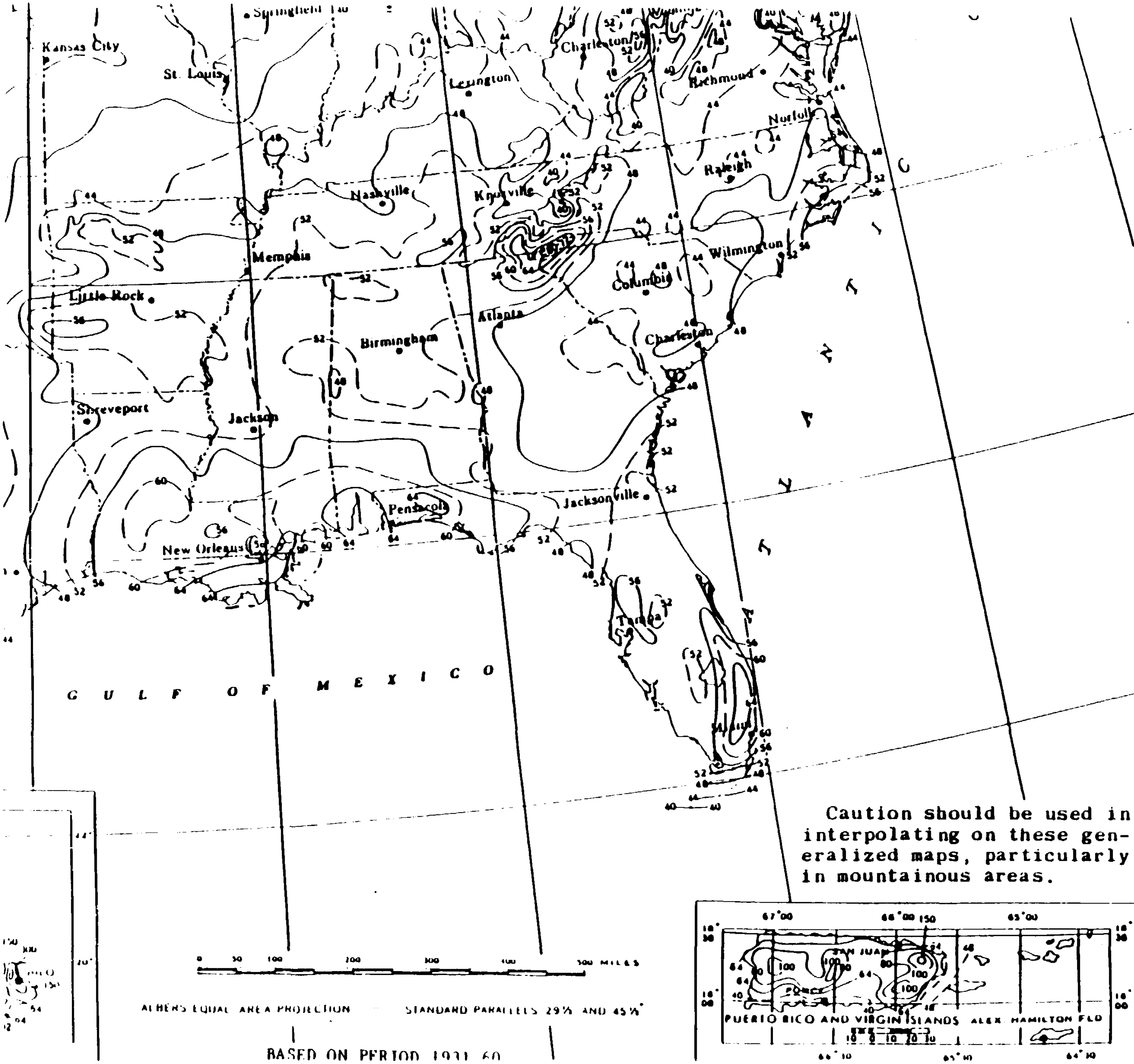
U.S. DEPARTMENT OF COMMERCE
C. R. Smith, Secretary

ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
Robert M. White, Administrator

ENVIRONMENTAL DATA SERVICE
Woodrow C. Jacobs, Director

JUNE 1968

REPRINTED BY THE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
1983



Caution should be used in interpolating on these generalized maps, particularly in mountainous areas.

Normal Annual [illegible] (Precipitation Inches) p. 37

ᴧKE EVAPORATION

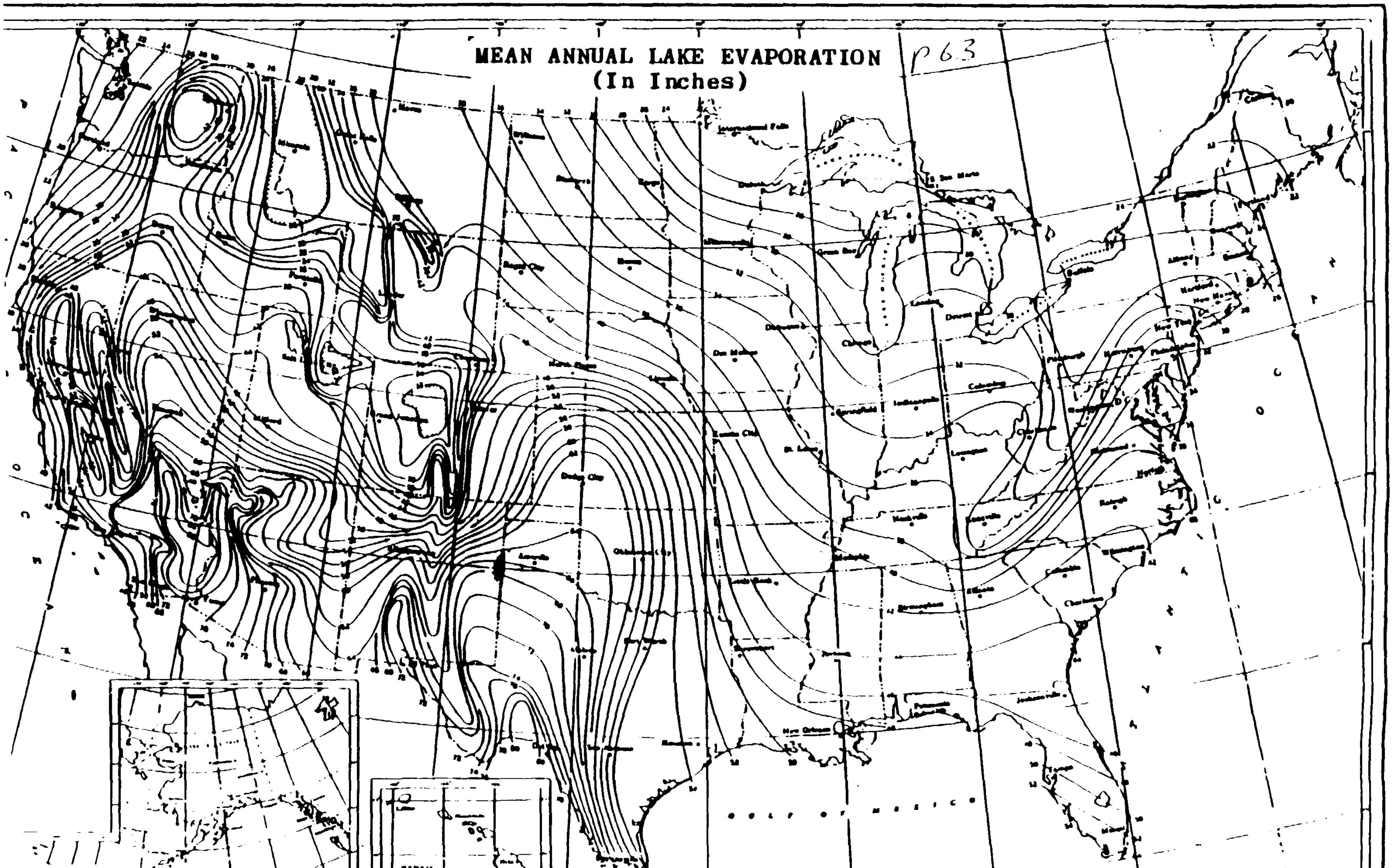


Plate 2 Based on period 1946-55

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

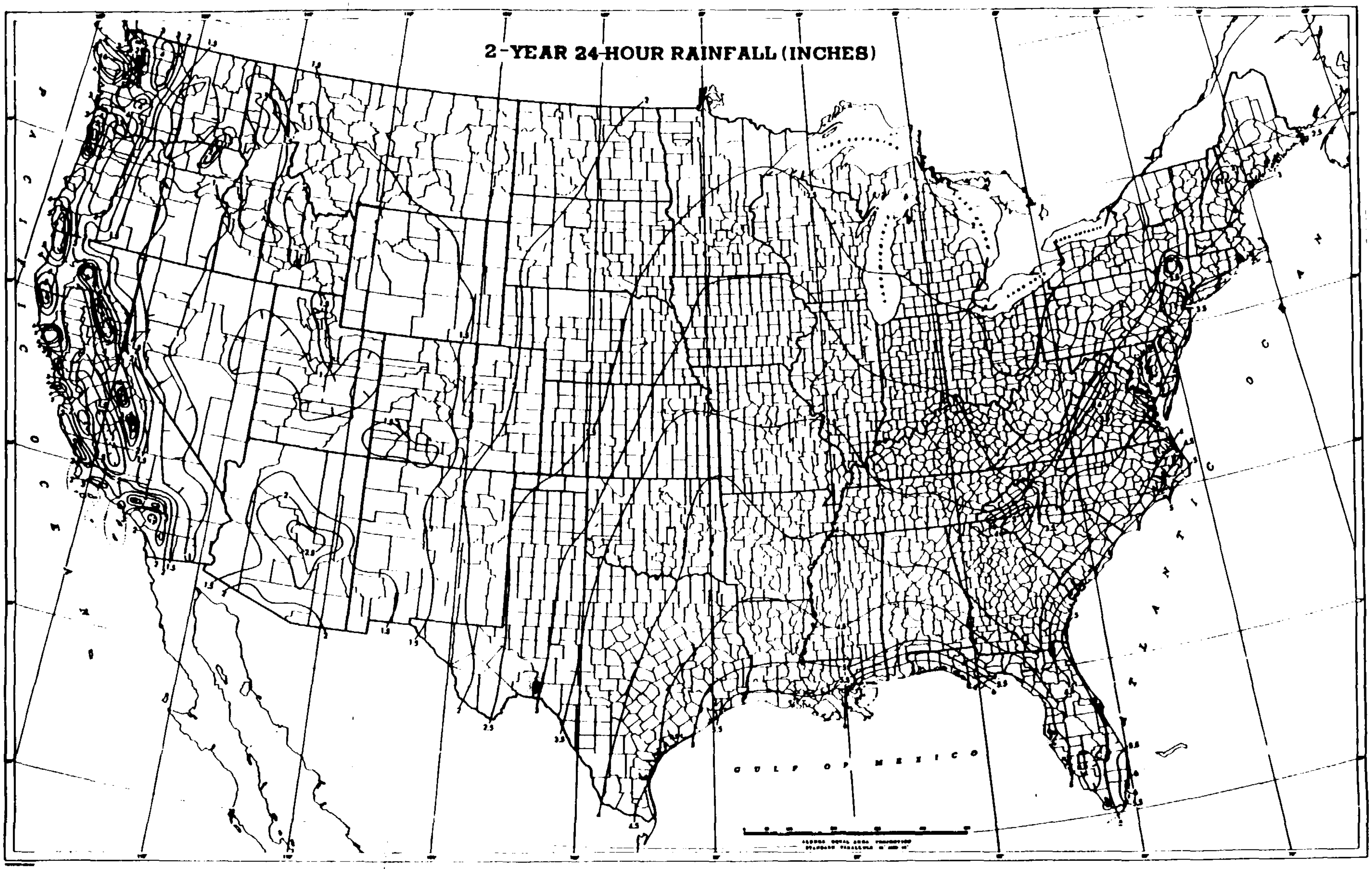
WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO

NUS CORPORATION AND SUBSID''

REFERENCE # 14

ECON NOTE

CONTROL NO. F4-9002-21	DATE: April 27, 1990	TIME: 1000
DISTRIBUTION: Acutec, Inc.		
BETWEEN: Steve Anderson	OF: Ft. Lauderdale Public Works	PHONE: (305) 761-5771
AND: Greg Thomas, NUS Corporation		

DISCUSSION:

Mr. Anderson stated that most side streets near the Ft. Lauderdale Executive Airport are serviced by french drains that channel water directly into the ground without prior treatment.

NUS 067 REVISED 0685

REFERENCE # 15

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES

BUREAU OF GEOLOGY

Robert O. Vernon, Chief

GEOLOGICAL BULLETIN NO. 51

THE GEOMORPHOLOGY OF THE FLORIDA PENINSULA

By
William A. White

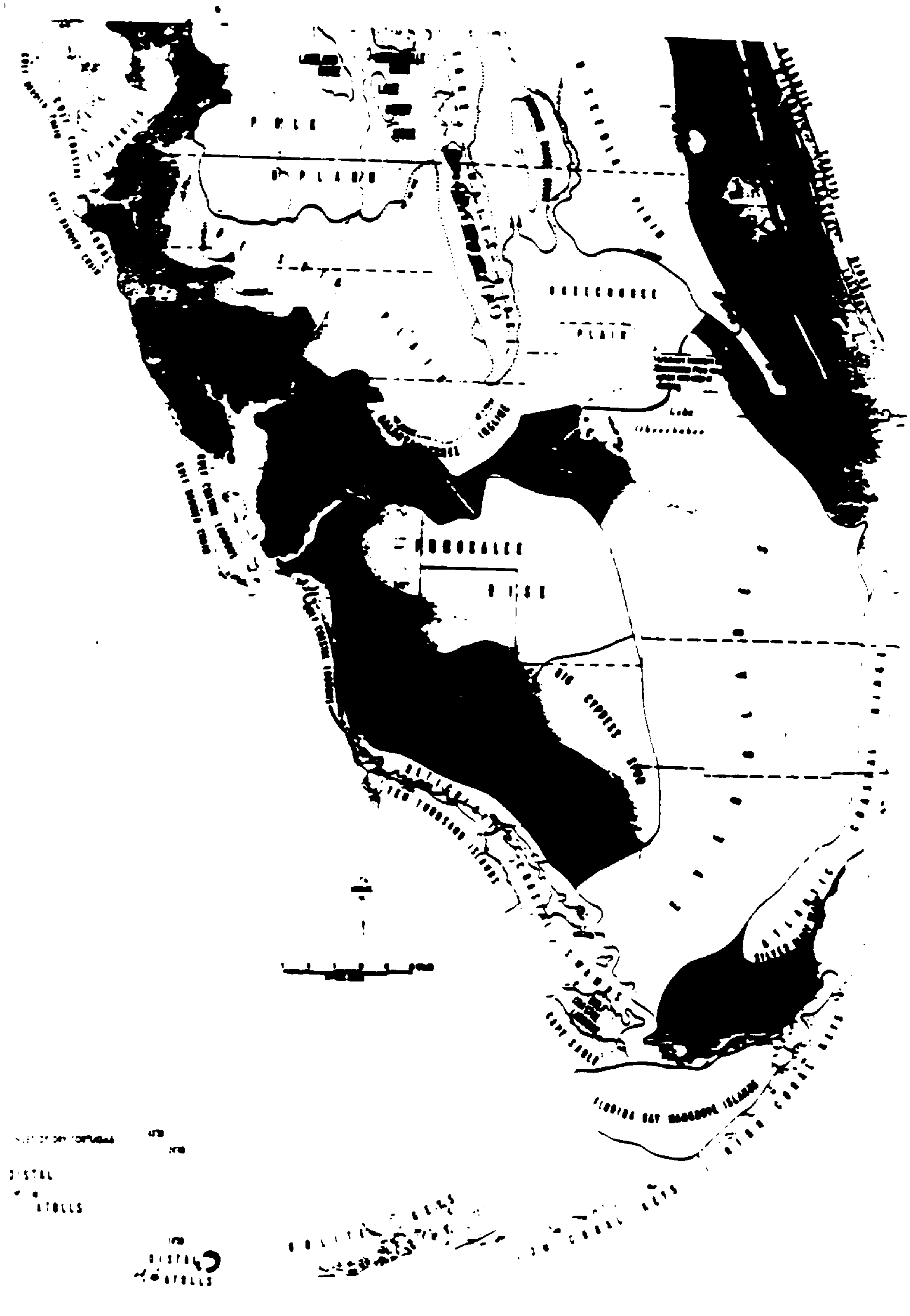
Published for
BUREAU OF GEOLOGY
DIVISION OF INTERIOR RESOURCES
FLORIDA DEPARTMENT OF NATURAL RESOURCES

Tallahassee, Florida
1970

CONTENTS

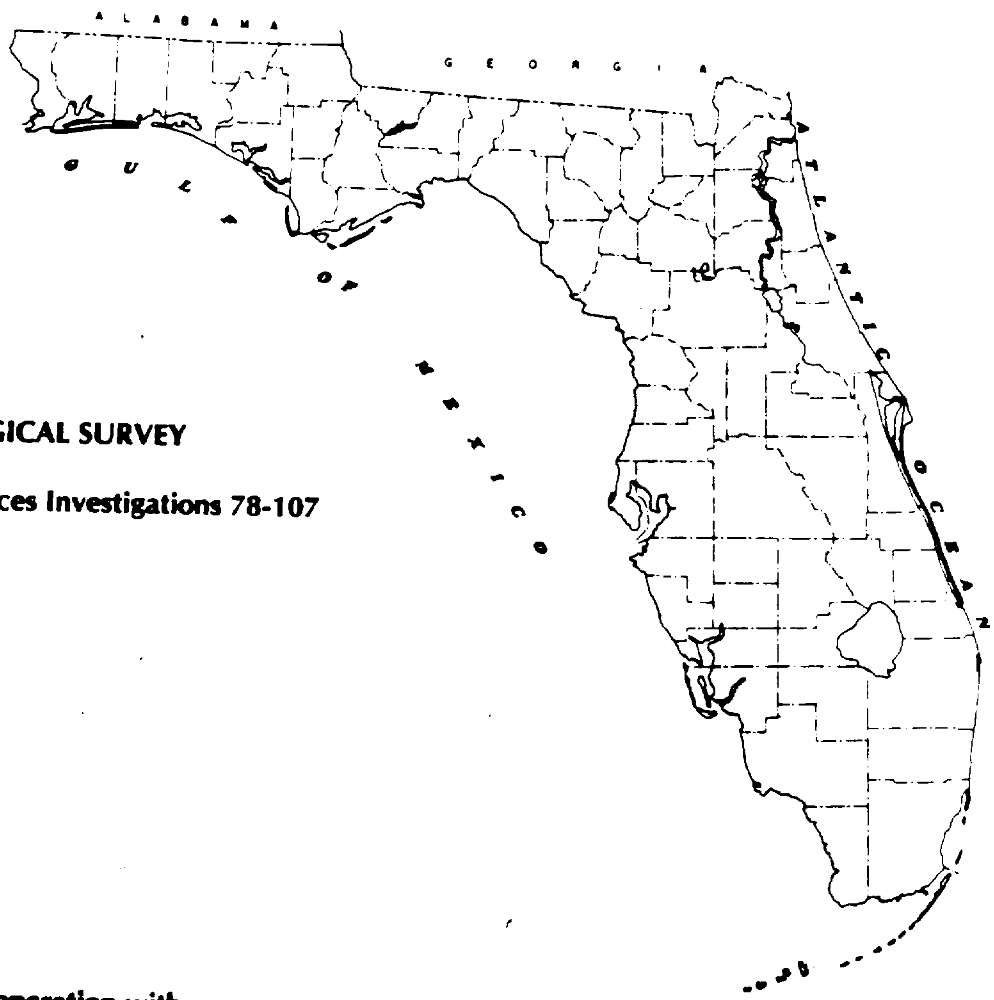
DEPARTMENT of NATURAL RESOURCES
DIVISION of INTERIOR RESOURCES

BUREAU of GEOLOGY



REFERENCE # 16

BISCAYNE AQUIFER, SOUTHEAST FLORIDA



U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 78-107

Prepared in cooperation with
U.S. ENVIRONMENTAL PROTECTION AGENCY

WRI 78-107 BISCAYNE AQUIFER, SOUTHEAST FLORIDA

BISCAYNE AQUIFER, SOUTHEAST FLORIDA

By H. Klein, and J. E. Hull

U.S. GEOLOGICAL SURVEY

Water-Resources Investigation 78-107

Prepared in cooperation with the

U.S. Environmental Protection Agency

September 1978

4. Title and Subtitle	5. Report Date
BISCAYNE AQUIFER, SOUTHEAST FLORIDA	6.
7. Author(s) H. Klein, J. E. Hull	8. Performing Organization Rept. No. USGS/WRI 78-107
9. Performing Organization Name and Address U.S. Geological Survey 7815 Coral Way, Suite 110 Miami, Florida 33155	10. Project/Task/Work Unit No. 11. Contract/Grant No.
12. Sponsoring Organization Name and Address U.S. Geological Survey, Water Resources Division 325 John Knox Road, Suite F-240 Tallahassee, Florida 32303	13. Type of Report & Period Covered 14.

15. Supplementary Notes

Prepared in cooperation with the U.S. Environmental Protection Agency

16. Abstracts Peak daily pumpage from the highly permeable, unconfined Biscayne aquifer for public water-supply systems in southeast Florida in 1975 was about 500 million gallons. Another 165 million gallons was withdrawn daily for irrigation. Recharge to the aquifer is primarily by local rainfall. Discharge is by evapotranspiration, canal drainage, coastal seepage, and pumping. Pollutants can enter the aquifer by direct infiltration from land surface or controlled canals, septic-tank and other drainfields, drainage wells, and solid-waste dumps. Most of the pollutants are concentrated in the upper 20 to 30 feet of the aquifer; public supply wells generally range in depth from about 75 to 150 feet. Dilution, dispersion, and adsorption tend to reduce the concentrations. Seasonal heavy rainfall and canal discharge accelerate ground-water circulation, thereby tending to dilute and flush upper zones of the aquifer. The ultimate fate of pollutants in the aquifer is the ocean, although some may be adsorbed by the aquifer materials en route to the ocean, and some are diverted to pumping wells.

17. Key Words and Document Analysis. 17a. Descriptors

Southeast Florida, Aquifer characteristics, *Ground-water quality, *Municipal water systems, *Water pollution, Urban runoff, Septic-tank effluent, Leachate, *Ground-water flow, Dilution, Unconfined ground water

17b. Identifiers/Open-Ended Terms

Dade County, Broward County, *Biscayne aquifer, Sole-source aquifer, Safe Drinking Water Act

17c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 57
	20. Security Class (This Page) UNCLASSIFIED	22. Price

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

H. William Menard, Director

For additional information write to:

U.S. Geological Survey
325 John Knox Road
Suite F-240
Tallahassee, Florida 32303

CONTENTS

ILLUSTRATIONS

BISCAYNE AQUIFER

Description

The Biscayne aquifer supplies all municipal water supply systems from south Palm Beach County southward (fig. 1), including the system for the Florida Keys which is supplied chiefly by pipeline from the mainland. It is a highly permeable wedge-shaped unconfined aquifer that is more than 200 ft (feet) thick in coastal Broward County and thins to an edge 35 to 40 mi (miles) inland in the Everglades (fig. 2). The aquifer forms an important unit of the hydrologic system of southeast Florida (fig. 3), which is managed by the South Florida Water Management District (SFWMD).

The Biscayne aquifer is composed of limestone, sandstone, and sand. In south and west Dade County the aquifer is primarily limestone and sandstone, but in north Dade County, Broward County and south Palm Beach County the aquifer is primarily sand. Generally, the sand content increases to the north and east.

In Dade County (fig. 4) oolitic limestone and quartz sand form the upper part of the aquifer (Parker and others, 1955, Plate 4). The limestone is thickest along the coast, possibly as much as 40 ft., but the base is usually less than 20 ft below sea level. Inland, the oolitic limestone thins and then disappears beneath the peat soil of the Everglades. Oolitic limestone is usually cross-bedded.

Fine to medium grained sand fills solution cavities in the oolitic limestone. Parker and others (1955, p. 102) indicated that the solution cavities occupy a significant volume of the limestone, causing it to have high horizontal and vertical permeabilities. It is the high vertical permeability that permits rapid infiltration of rainfall to the water table. Where the limestone does not crop out, it is covered by quartz sand (fig. 4) which also permits rapid infiltration of rainfall.

In the east part of Dade County, extending north as far as Fort Lauderdale, the lower part of the oolitic limestone contains bryozoans (Hoffmeister, 1974, p. 39). The bryozoan section slopes upward to the west to emerge at the surface in the Everglades. Near the coast the bryozoan section is as much as 10 ft thick (Hoffmeister, 1974, p. 39); it thins to the west beyond the east boundary of Collier County. The bryozoan limestone is also riddled with cavities which contribute to its high horizontal and vertical permeability.

Below the bryozoan layer, the Biscayne aquifer is composed of hard limestone containing numerous cavities, often cavernous. Because of the extremely high permeability of this limestone, all large-capacity wells are completed in this part of the aquifer, generally 40 to 100 ft below the land surface. The cavernous section generally does not contain loose sand. The aquifer does, however, contain thin interbedded layers of hard, dense limestone in south Dade County, interior parts of Dade County and southwest Broward County. The dense layers probably are discontinuous and may locally retard, but do not prevent the vertical circulation of ground water. Beneath the coastal areas unconsolidated quartz sand separates the bryozoan limestone from the deeper hard limestone. The sand content increases northward which results in a corresponding decrease in overall transmissivity of the aquifer.

Parker and others (1955, p. 160) stated that the Biscayne aquifer "is the most productive of the shallow nonartesian aquifers in the area and is one of the most permeable in the world". He suggested that in east Dade County the transmissivity (hydraulic conductivity x saturated thickness = transmissivity) of the aquifer ranges from 4 to 15 million gallons per day per foot (Mgal/d/ft) ($5.\times10^5$ to 2.0×10^6 ft^2/d). He applied a median value of 5 (Mgal/d/ft) (6.7×10^5 ft^2/d) (Parker and others, 1955, p. 270). These values were obtained from aquifer tests using high-capacity wells, and by analyzing water-table contours adjacent to canals and in well-field areas. Storage coefficients from aquifer tests ranged from 0.047 to 0.247 (Parker and others, 1955, table 16).

The approximate areal distribution of transmissivity of the aquifer is shown in figure 5. Along the coast and in the northern part of southeast Florida the aquifer is thickest, but because it is composed mainly of sandy material, the transmissivity is lower. In central and south Dade County the aquifer is thinner, but the hydraulic conductivity is high because of the cavernous limestone; the transmissivity is, therefore, high. The decrease in transmissivity to the west is due to the thinning of the aquifer.

The transmissivity ranges from about 3 Mgal/d per foot (4.0×10^5 ft^2/d) in southeast Broward County to 0.4 Mgal/d per foot (5.4×10^4 ft^2/d) in the northeast coastal Broward County (Sherwood and others, 1973, p 66-67) and in the vicinity of Boca Raton (McCoy and Hardee, 1970, p. 25). Values increase to about 4 Mgal/d per foot (5.4×10^5 ft^2/d) (Sherwood and others, 1973, p. 66) in interior parts of southern Broward County. In Boca Raton, fine and medium sand extends to at least 60 ft below the surface. Permeable limestone at greater depth is discontinuous and becomes increasingly sandy north of Boca Raton (McCoy and Hardee, 1970, p. 7-11). Storage coefficients in Broward County are as high as 0.34 (Sherwood and others, 1973, p. 67).

Soil Cover

The soil that covers southeast Florida is of hydrologic importance because it controls the infiltration of rainfall, the operation of septic tanks, and indirectly relates to the quality of the ground water. The infiltration of rainfall is rapid in areas covered by sand or where soil is absent; infiltration is retarded in areas covered by marl or clayey soil.

In the agricultural areas of south and interior Dade County, irrigation wells are usually rotary drilled to depths of 25 to 35 ft. Casing is not required because the aquifer is solely limestone. Hundreds of these wells are drilled at spacings as small as 300 ft. A large capacity irrigation pump mounted on a truck is moved from well to well and each is pumped for short intervals at rates of 500 to 1,000 gpm.

Thousands of small diameter (2-inch) wells are used throughout the year for irrigation of residential lawns and shrubs. These wells, about 20 to 50 ft deep, are normally pumped at rates of 25 to 40 gpm. In areas near the coast or adjacent to tidal canals no fresh ground water is available so residences use municipal water for lawn irrigation. Shallow wells of small diameter are also used for domestic supplies in areas not serviced by municipal systems.

Recharge and Discharge

The Biscayne aquifer is recharged principally by rainfall. The average annual rainfall in the lower east coast area varies areally from 58 to 64 in; the annual extremes experienced are 29 in and 106 in (Leach and others, 1972, p. 9-10). The rainy season, June - October, contributes about 70 percent of the total. During this period heavy rains are associated with tropical disturbances and frequent short, local downpours. Light to moderate rainfall during the dry season is associated with cold fronts moving southward through Florida.

The oolitic limestone and sand that form the upper surface of the aquifer readily absorb rainfall and move it rapidly to the water table. The rapid response of the water table to rainfall in the Miami area is indicated in figure 9. Infiltration of rainfall is retarded but not prevented in interior parts of Dade and Broward Counties where thin marl deposits cover the surface, and along the shallow elongate depressions that dissect the urban area. Other sources of recharge to the aquifer are: (1) Connate ground water of inferior quality (Parker and others, 1955, fig. 221) along the upper reaches of the Miami, the North New River, and the Hillsboro Canals in Broward and Palm Beach Counties (northwest of the limits of the Biscayne aquifer) that is transferred eastward during dry seasons; (2) Water from Lake Okeechobee released by the SFWMD into the Miami Canal during the later weeks of the dry seasons to replenish the Miami area; and (3) Effluent from septic tanks, certain sewage treatment plant and disposal ponds scattered throughout the urban area.

Parker and others (1955) and Meyer (1971) estimated that 20 in of the approximately 60 in of annual rainfall in Dade County is lost directly by evaporation, about 20 in is lost by evapotranspiration after infiltration, 16 to 18 in is discharged by canals and by coastal seepage, and the remainder is utilized by man. Sherwood and others (1973, p. 49) indicated comparable values for Broward County. Thus, nearly 50 percent of the rainfall that infiltrates the Biscayne aquifer is discharged to the ocean, a reflection of the high degree of connection between the aquifer and the canal system.

REFERENCE # 17

NUS CORPORATION **INTERNAL CORRESPONDENCE**

C-586-3-0-209

TO:	K. D. Pass, Florida Section Leader	DATE:	March 22, 1990
FROM:	W. Smitherman	COPIES:	Phil Blackwell Bob Donaghue Katharine Siders

SUBJECT: Municipal Water Systems for Broward County, Florida

Due to the large number of sites in Broward County to be assessed, I have assembled a data base for the municipal water systems in the county. Information was obtained during visits to the municipalities, telephone conversations and through the mail. Two basic documents were generated, the first being the data base (attached as Appendix A) to provide the system names, a principal contact to verify information, telephone numbers, addresses, the number of connections or population served, number of wells and wellfields and a remarks section. The second document is a detailed topographic map showing the extent of the municipalities' distribution system along with the location of their wells and wellfields. In addition to the topographic map, almost all the municipalities provided maps, showing their distribution areas along with the wells and wellfields, for additional reference if needed.

The topographic map will be available in a central location so that the project managers can locate their sites on the map. The project managers can then identify the systems (wellfields) within the 4-mile radius of their sites and use the data base to call up only those municipalities within the 4-mile radius that pertain to their sites.

In preparing this information, several interesting items were identified:

1. The city of Ft. Lauderdale provides potable water to the cities of Wilton Manor and Oakland Park, since they do not have wells.

2. The city of Coconut Creek purchases water from the Broward County Utility Dept. (BUCD)-2A wellfield. Coconut Creek does not have municipal wells.

3. The city of Coral Springs has 4 different systems within the city limits. Coral Springs Improvement District provides potable water to the southern third of the city. The city of Coral Springs provides water to the middle third of the city. Royal Utilities (a small area) and the North Springs Improvement District provides potable water to the northern third of the city.

4. Broward County Utility Department (BCUD) has 7 systems in the county; however, system BCUD 3C is off-line and potable water is provided by the city of Hollywood.

5. All systems in the county have emergency hook-ups with other municipalities, except the Royal Utilities in Coral Springs. This system has no emergency hook-up.

6. Several communities have multiple wellfields; in all cases the water is mixed in the distribution lines. The three systems for the city of Plantation are presented since the number of connections for each were available.

7. The depths of wells were not recorded on the data base, since all the wells are obtaining water from the Biscayne aquifer, a sole-source aquifer. However, information obtained during interviews revealed that most municipal wells ranged from 80-120 feet below land surface (bls).

8. In general, the distribution area for each municipality was normally the corporate city limits.

The objective of this memorandum was to gather the needed information into one source and to assist the project manager in obtaining the groundwater use data necessary to complete the site assessments in a timely manner. Bringing together all the municipal systems in the county into one data base and one map showing the locations should expedite this process. Any project managers wishing to access the data base should consult either you or me.

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

03/28/90

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
BCUD - 1A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	10843 (C)	7	1	03/19/90	Emergency hookups with Ft. Lauderdale, Tamarac, and Lauderdale
BCUD - 1B	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	3397 (C)	5	1	03/15/90	In production 8 hrs/day, interconnect with BCUD-1A Emergency hookup with Ft. Lauderdale
BCUD - 2A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	18170 (C)	9	2	03/15/90	Emergency hookups with Deerfield Beach
BCUD - 3A	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	5305 (C)	6	1	03/15/90	Emergency hookups with Dania, Ft. Lauderdale
BCUD - 3B	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	6207 (C)	4	1	03/15/90	Emergency hookups with Miramar and Hollywood
BCUD - 3C	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	3648 (C)	3	1	03/15/90	System OFF-LINE; Purchasing water from City of Hollywood
BROADVIEW	MIKE SCOTTIE (305)960-3051	BROWARD CTY UTIL DPT 2401 N POWERLINE RD POMPANO BEACH, FL 33064	2185 (C)	3	1	03/15/90	Emergency hookups with Tamarac and N. Lauderdale
BROADVIEW PARK W.D.	MIKE SCHWAB (305)583-4223	BROADVIEW PARK W.D. 1955 SW 50TH AVE PLANTATION, FL 33317	1800 (C)	1	1	03/19/90	Emergency hookups with Plantation
COCONUT CREEK	GARTH HINCKEL (305)973-6784	COCONUT CK WATER DPT 4800 W COPAND RD COCONUT CREEK, FL 33063	32000 (P)	0	0	03/19/90	Potable water supplied by BCUD - 2A
COOPER CITY	GEORGE HACKNEY (305)434-5519	COOPER CITY UTIL 90 SW 50TH PLACE COOPER CITY, FL 33328	7500 (C)	6	2	03/15/90	Emergency hookups with Dania and Bonaventure

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

03/28/90

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
CORAL SPRGS IMPRM DS	CHUCK PERRON (305)753-0380	CORAL SPRGS IMPRM DS 10300 NW 11TH MANOR CORAL SPRINGS, FL 33071	30000 (P)	7	1	03/19/90	Emergency hookups with Coral Springs
CORAL SPRINGS	AL PAZIN (305)344-1172	CITY OF CORAL SPRING 9551 W SAMPLE RD CORAL SPRINGS, FL 33075	40000 (P)	12	1	03/19/90	Emergency hookups with Coral Springs and North Springs Improvement Dist
DANIA	DON WINDHAM (305)921-7781	BERRY AND CALVIN INC 2 OAKWOOD BLVD ST120 HOLLYWOOD, FL 33020	4064 (C)	2	1	03/15/90	Additional potable water provided by BCUD, Ft. Lauderdale and Hollywood
DAVIE	DANIEL COLABELLA (305)797-1080	DAVIE WATER SYSTEM 6591 SW 45TH ST DAVIE, FL 33314	7000 (C)	16	2	03/19/90	Emergency hookups with Hollywood, Cooper City and Ft. Lauderdale
DEERFIELD BEACH	DALE HOLINBECK (305)480-4270	CITY OF DEERFIELD BC 150 NE 2ND AVE. DEERFIELD, FL 33441	10800 (C)	18	2	03/15/90	Emergency hookups with BCUD 2A, Hillsboro Bch and Boca Raton
FERNCREST UTILITIES	ROBERT SALERNO (305)989-6200	FERNCREST UTILITIES 3015 SW 54TH AVE. FT. LAUDERDALE, FL 33314	1600 (C)	2	1	03/15/90	Emergency hookups with Davie and Ft. Lauderdale
FT LAUDERDALE	JAMES SINDELAR (305)492-7858	FT LAUDERDALE UTIL P.O. BOX 14250 FT. LAUDERDALE, FL 33302	56000 (C)	43	2	03/15/90	Supply potable water to Wilton Manor, Oakland Park, BCUD, BC Port Auth, Dania and Tamarac East
HILLSBORO BEACH	RODNEY MAIN (305)941-8937	HILLSBORO BCH WATER 925 NE SAMPLE RD POMPANO BEACH, FL 33064	185 (C)	3	1	03/15/90	Emergency hookups with BCUD 2A, Deerfield Beach, Seasonal pop from 2300 - 3800
HOLLANDALE	MIKE GOOD (305)458-3251	DEPT OF PUBLIC WORKS 308 S DIXIE HWY HOLLANDALE, FL 33009	5500 (C)	2	1	03/15/90	6 wells shut down, salt-water intrusion. Additional water supplied by N. Miami
HOLLYWOOD	MARSHALL BERGAKER (305)921-3251	CITY OF HOLLYWOOD UT P.O.BOX 229045 HOLLYWOOD, FL 33022	130000 (P)	20	2	03/28/90	Supplies potable water to Dania. Emergency hookups with surrounding municipalities

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

03/28/90

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
LAUDERHILL	JOHN SCHRIEFFER (305)739-0100	CITY OF LAUDERHILL 2000 CITY HALL DRIVE LAUDERHILL, FL 33313	8600 (C)	7	1	03/21/90	Emergency hookups with Plantation and Sunrise
MARGATE	RICK VAN ACKER (305)972-0828	MARGATE UTILITIES 1001 W RIVER DR MARGATE, FL 33063	23723 (C)	12	2	03/19/90	Emergency hookups with N. Lauderdale and Pompano Beach
MIRAMAR	LOU BADAMI (305)989-6200	MIRAMAR CITY HALL 6740 MIRAMAR PKWY MIRAMAR, FL 33083	12100 (C)	9	2	03/15/90	Emergency hookups with BCUD 3C and Pembroke Pine
NORTH LAUDERDALE	ED GOEBELS (305)722-0900	CITY OF N LAUDERDALE 701 SW 71ST AVE NORTH LAUDERDAE, FL 33068	6328 (C)	3	1	03/19/90	Emergency hookups with Tamarac, BCUD, and Margate
NORTH SPRGS IMPRM DS	CHUCK PERRON (306)753-0380	NORTH SPRGS IMPRM DS 10300 NW 11TH MANOR CORAL SPRINGS, FL 33071	5000 (P)	2	1	03/19/90	Emergency hookups with Coral Springs. Two (2) new wells due 6/90
OAKLAND PARK	ROLLAND SALSBERRY (305)561-6259	OAKLAND PARK UTIL 3650 NE 12TH AVE OAKLAND PARK, FL 3334	2700 (C)	0	0	03/15/90	Potable water supplied by City of Ft. Lauderdale
PEMBROKE PINES	DAVE MARTINEZ (305)435-6540	CITY OF PEMBROKE PNS 7960 JOHNSON ST PEMBROKE PINES, FL 33024	31581 (C)	8	2	03/15/90	Emergency hookups with Cooper City, Hollywood and Miramar
PLANTATION CENTRAL	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 700 NW 91ST AVE PLANTATION, FL 33317	10043 (C)	10	1	03/23/90	Interconnected with Plantation East System
PLANTATION EAST	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 500 NW 65TH AVE PLANTATION, FL 33317	9891 (C)	10	1	03/28/90	Emergency hookups with Ft. Lauderdale, Sunrise and Broward Park. Interconnected with Pltn Cntrl
PLANTATION WEST	DUAINE WALLACE (305)797-2169	CITY OF PLANTATION 700 NW 91ST AVE PLANTATION, FL 33317	1336 (C)	0	0	03/23/90	Potable water supplied by Plantation Central

MUNICIPAL WATER SYSTEM
FOR BROWARD COUNTY, FL

03/28/90

SYSTEM	CONTACT PHONE	ADDRESS	(P)OP SERVED (C)ONNECTIONS	# OF WELLS	# OF FIELDS	DATE ENTERED	REMARKS
POMPANO BEACH	STAN LEMCKE (305)786-4105	POMPANO BCH PBLC WKS P.O.BOX 1300 POMPANO BEACH, FL 33061	16900 (C)	22	2	03/19/90	Emergency hookups with BCUD - 2A
ROYAL UTILITY	DOUGLAS BRIGHT (305)341-7565	ROYAL UTILITY CO 8900 NW 44TH COURT CORAL SPRINGS, FL 33065	173 (C)	3	1	03/19/90	No Emergency hookups
SUNRISE	WALTER GERRARD (305)741-6570	CITY OF SUNRISE 4350 SPRINGTREE DR SUNRISE, FL 33351	29742 (C)	28	3	03/22/90	Emergency hookups with Plantation and Lauderhill
TAMARAC	LONNIE SCOTT (305)726-2300	TAMARAC UTILITIES 7805 NW 61ST ST TAMARAC, FL 33321	17074 (C)	13	1	03/19/90	Emergency hookups with BCUD -1A and Lauderhill
WILTON MANOR	JOE MOSS (305)390-2190	CITY OF WILTON MANOR 524 NE 21ST COURT WILTON MANOR, FL 33305	4500 (C)	0	0	03/15/90	Potable water supplied by city of Ft. Lauderdale

REFERENCE # 18

GEOLOGY OF THE SURFICIAL AQUIFER SYSTEM
BROWARD COUNTY, FLORIDA

LITHOLOGIC LOGS

By Carmen R. Causaras

U.S. GEOLOGICAL SURVEY

WATER-RESOURCES INVESTIGATIONS REPORT 84-4068

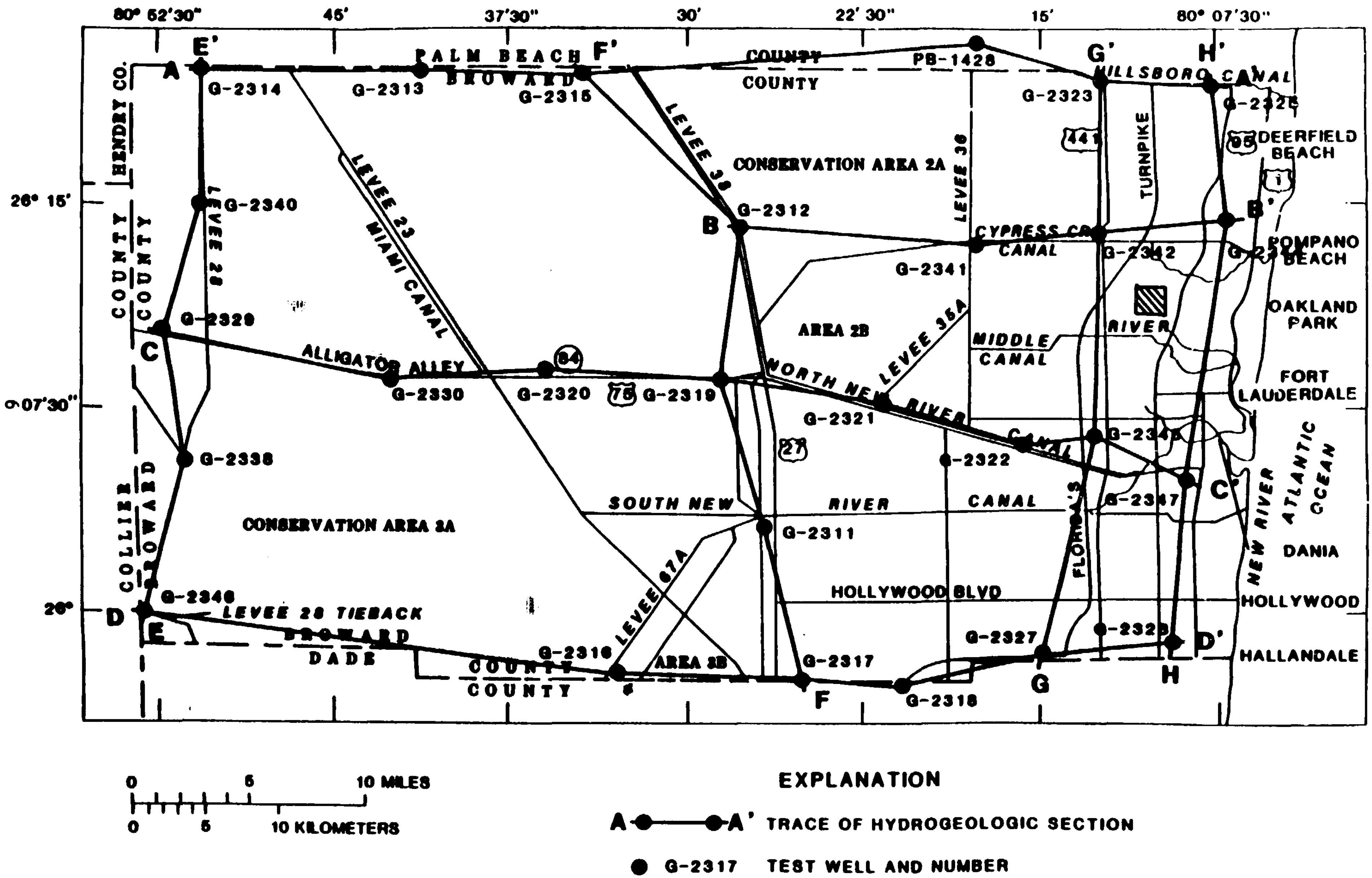
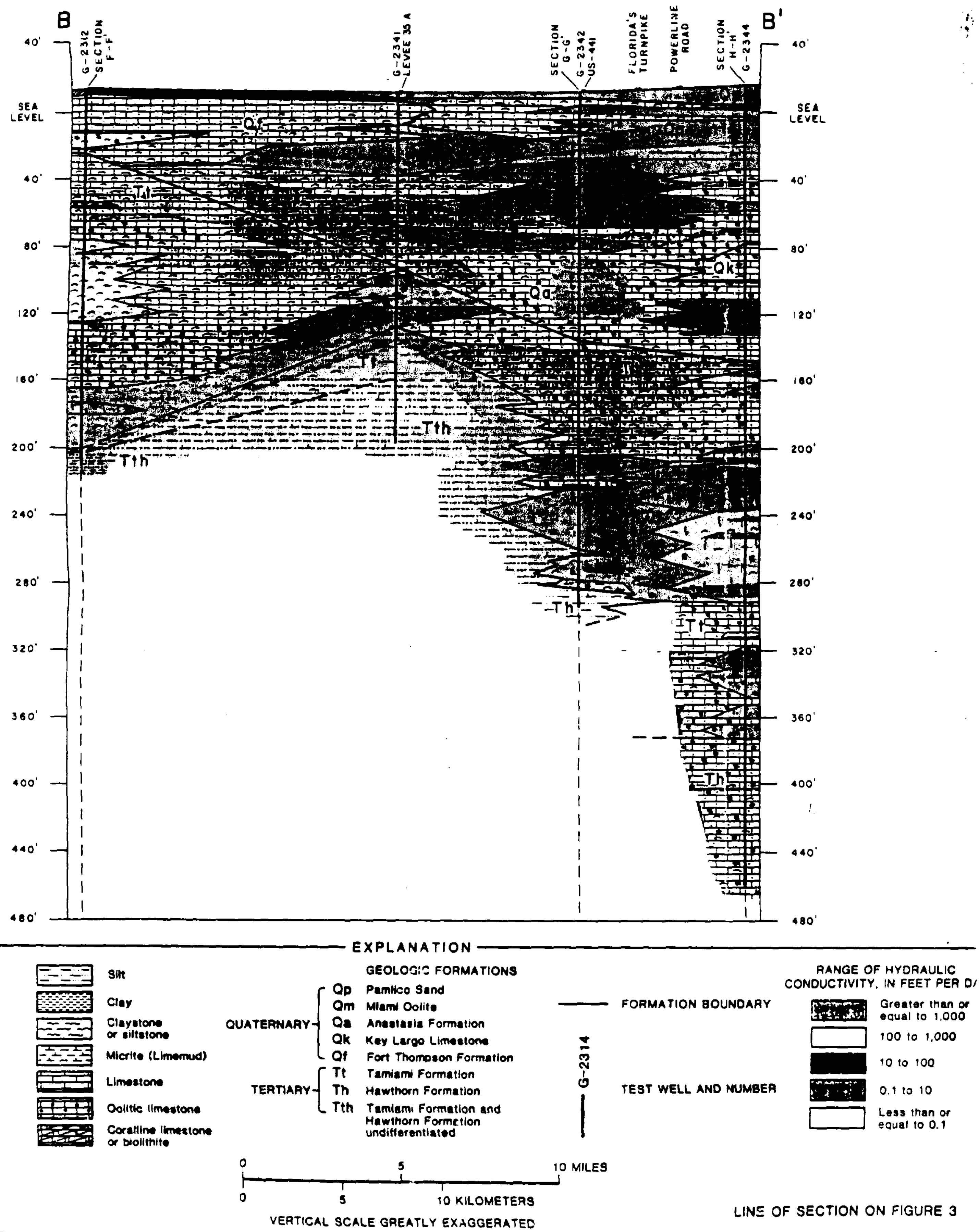
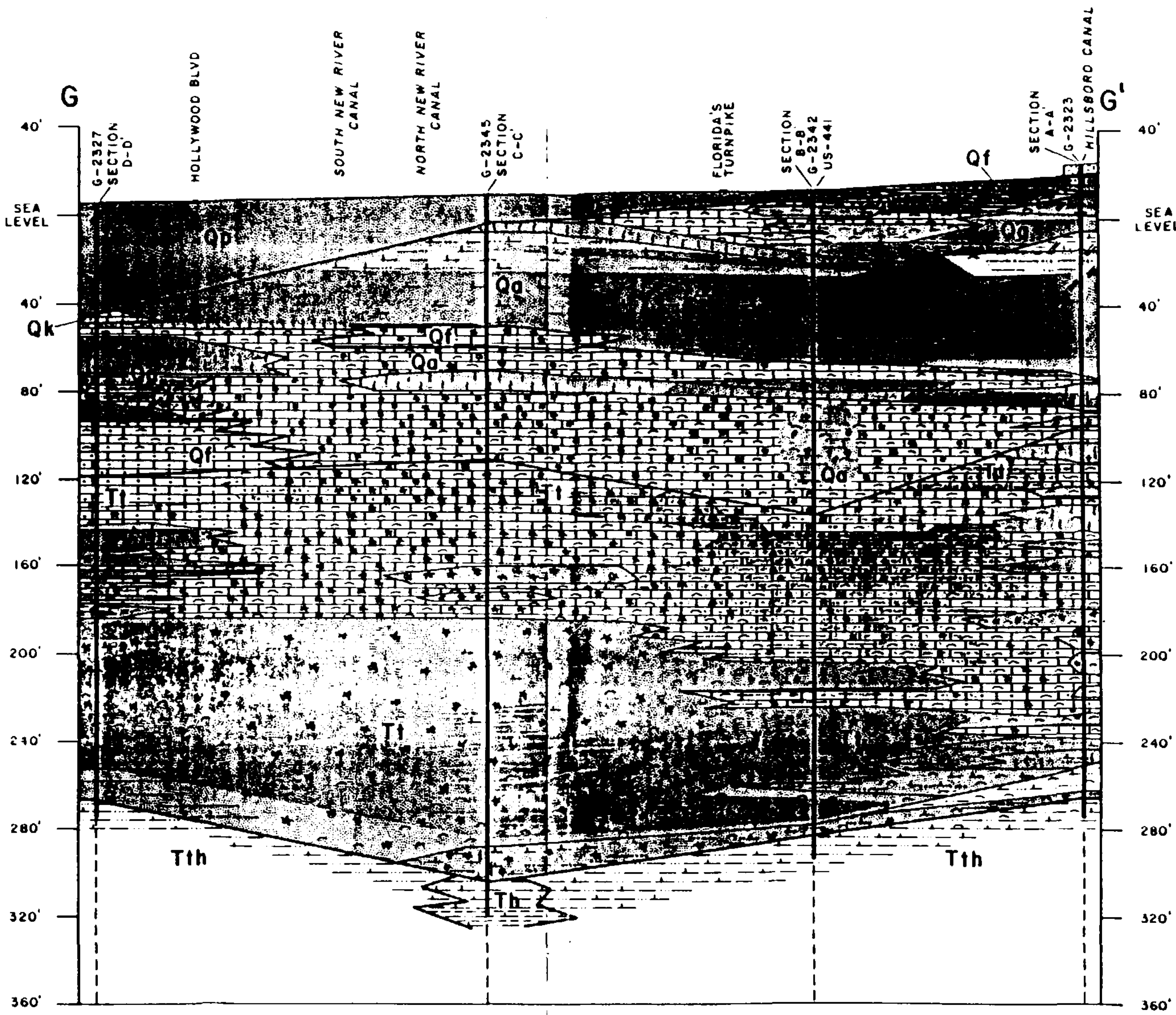


Figure 3.--Location of test drilling sites and hydrogeologic sections (from Causarás, 1985). Well numbers and site names are listed in table 1.

LOCATION OF EXECUTIVE AIRPORT, FORT LAUDERDALE FLORIDA
(AREA 1 and 1/2 miles by 2 miles)


B
B'
G-2312
SECTION F-F'
G-2341
LEVEE 35 A
SECTION G-G'
G-2342
US-441
FLORIDA'S TURNPIKE
POWERLINE ROAD
SECTION H-H'
G-2344
40'
SEA LEVEL
40'
80'
120'
160'
200'
240'
280'
320'
360'
400'
440'
480'
Qf
Tt
Qa
Qk
Tth
Th
EXPLANATION
Fill
Peat or muck
Sand
Sandstone
Detrital carbonate sand
Concretions
Shell
Silt
Clay
Claystone or siltstone
Micrite (Limemud)
Limestone
Oolitic limestone
Coralline limestone or biolithite
GEOLOGIC FORMATIONS
QUATERNARY
Qp Pamlico Sand
Qm Miami Oolite
Qa Anastasia Formation
Qk Key Largo Limestone
Qf Fort Thompson Formation
TERTIARY
Tt Tamiami Formation
Th Hawthorn Formation
Tth Tamiami Formation and Hawthorn Formation undifferentiated
FORMATION BOUNDARY
G-2314
TEST WELL AND NUMBER
RANGE OF HYDRAULIC CONDUCTIVITY, IN FEET PER D/
Greater than or equal to 1,000
100 to 1,000
10 to 100
0.1 to 10
Less than or equal to 0.1
0 5 10 MILES
0 5 10 KILOMETERS
VERTICAL SCALE GREATLY EXAGGERATED
LINE OF SECTION ON FIGURE 3



EXPLANATION

Fill
Peat or muck
Sand
Sandstone
Detrital carbonate sand
Concretions
Shell
Silt
Clay
Claystone or siltstone
Micrite (Limemud)
Limestone
Oolitic limestone
Coralline limestone or biolithite

GEOLOGIC FORMATIONS

QUATERNARY
- Qp Pamlico Sand
- Qm Miami Oolite
- Qa Anastasia Formation
- Qk Key Largo Limestone
- Qf Fort Thompson Formation

TERTIARY
- Tt Tamiami Formation
- Th Hawthorn Formation
- Tth Tamiami Formation and Hawthorn Formation undifferentiated

FORMATION BOUNDARY

G-2314 TEST WELL AND NUMBER

RANGE OF HYDRAULIC CONDUCTIVITY, IN FEET PER DAY

- Greater than or equal to 1,000
- 100 to 1,000
- 10 to 100
- 0.1 to 10
- Less than or equal to 0.1

0 5 10 MILES

0 5 10 KILOMETERS

VERTICAL SCALE GREATLY EXAGGERATED

LINE OF SECTION ON FIGURE 3

REFERENCE # 19

Water Resources of Southeastern Florida

By GARALD G. PARKER, G. E. FERGUSON, S. K. LOVE, *and others*

WITH SPECIAL REFERENCE TO THE GEOLOGY AND GROUND WATER OF THE MIAMI AREA

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1255

Prepared in cooperation with the Florida Geological Survey, Dade County, cities of Miami and Miami Beach, and other agencies

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1955

CLIMATE AND VEGETATION

Climate is an important factor and has a profound effect on both organic and inorganic materials. Southern Florida has a semi-tropical climate. Rainfall is plentiful (50 to 60 inches per year), humidity is usually high, winds blow most of the time, and an occasional hurricane roars in from the tropical seas. (See section on Climate, p. 15–56.)

The principal effects of climate upon topography in southern Florida are brought about by the plentiful supply of rain that flows over or enters the rocks and attacks them both chemically and mechanically. Solution, a result of chemical attack on carbonate rocks, produces the characteristic karst topography of a limestone terrain.

Running water has carved valleys but in southern Florida its principal effect is solution. (Note on the hypsometric map, pl. 10, the indentations partly brought about by streams working on the marine terraces.)

On the flat terrace lands streams are sluggish and drainage is imperfect. The combination of physical conditions mentioned above has developed one of the largest areas of principally organic soils in the world—the Everglades. Outside the main body of the Everglades—extending up Kissimmee River, Fisheating Creek, and in old lagoons and swales between ancient beach ridges—other smaller deposits of peat and muck have developed.

These organic deposits would continue to build up even today, but they are prevented from doing so by drainage operations. This problem has been discussed by Evans and Allison (1942, p. 34–46).

Not only is the climate favorable to the growth of swamp plants, but it enables bunch grasses, pines, palmettos, and other semi-tropical-to-tropical vegetation to grow on the old beach sands and dunes. This vegetation helps to prevent continuous drifting of the sands before prevailing winds and, by preserving their forms, helps the immature drainage pattern to become better established.

SOLUTION

Southern Florida is underlain by limestone and other calcareous deposits and, because surface waters usually contain natural acids, solution plays a more important role than abrasion in the development of topographic features. At times in the past, when the Floridan Plateau stood high above the sea, few, if any, deep gorges were carved by running water. Instead, both surface and underground rocks were etched and made cavernous by the lateral

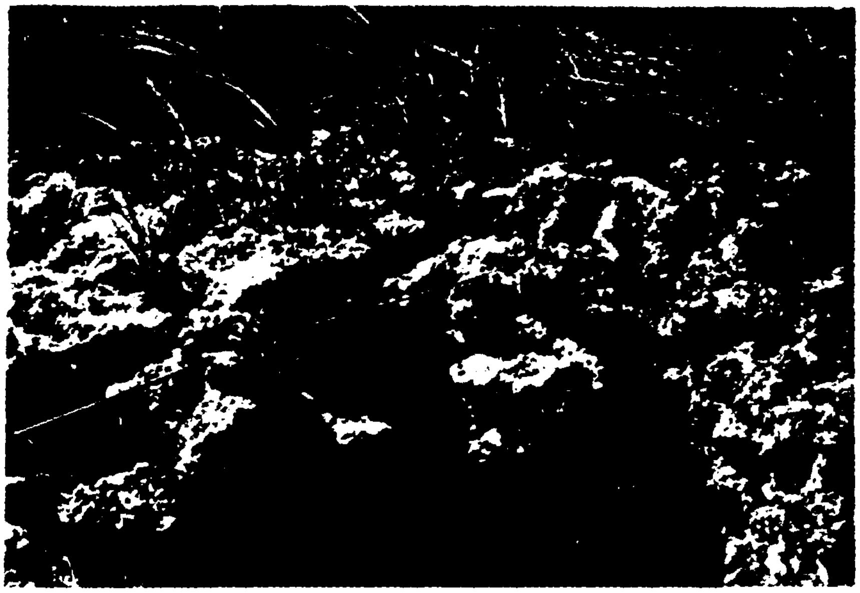


Figure 25.--Close-up view of one o. the larger solution holes in Dade County.

and downward movement of corrosive waters. (See figs. 15, 25 and 26.)

Apparently, no original cavity is needed to start a solution hole, though the existence of a ready-made hole hastens the process. It has been suggested that many vertical solution holes begin to be dissolved along taproots of trees, and possibly some holes do originate in this fashion, but it is not the most common way. On the surface of hard limestone or soft calcareous clayey marl the first effects of solution appear as small surficial pits resembling raindrop marks in mud. These pits gradually deepen, many retaining their rounded outlines. Without visible outlet along the sides or bottom, they later become tubes which enlarge into holes of various shapes and sizes, but generally they develop vertically.

The work of solution is evident wherever outcrops of rock occur, as on the bare limestone surface south of Miami or in the Big Cypress Swamp, in canals and street cuts, in borrow ditches and rock quarries, or in river and creek banks. In large areas of southern Florida it is evident that at least one-fourth of the total volume of limestone, once more or less solid rock, is now occupied by solution holes, generally filled with sand. (See fig. 26.) Trees blown over by hurricanes rip up rock with their roots, thus leaving a new and localized depression for concentration of rain water and the start of active solution holes. Adjacent holes enlarge, coalesce, and become increasingly effective in draining surface water underground. Many solution depressions of this kind,

REFERENCE # 20

STATE OF FLORIDA

STATE BOARD OF CONSERVATION

Ernest Mitts, Director

FLORIDA GEOLOGICAL SURVEY

Herman Gunter, Director

REPORT OF INVESTIGATIONS NO. 17

BISCAYNE AQUIFER OF DADE AND BROWARD COUNTIES, FLORIDA

By

Melvin C. Schroeder, Howard Klein, and Nevin D. Hoy

U. S. Geological Survey

Prepared by the

UNITED STATES GEOLOGICAL SURVEY

in cooperation with the

FLORIDA GEOLOGICAL SURVEY

CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL DISTRICT

DADE COUNTY

CITIES OF MIAMI, MIAMI BEACH and FORT LAUDERDALE

TALLAHASSEE, FLORIDA

1958

TABLE OF CONTENTS

ILLUSTRATIONS

BISCAYNE AQUIFER OF DADE AND BROWARD COUNTIES, FLORIDA

ABSTRACT

The Biscayne aquifer is the only source of fresh ground water in Dade and Broward counties, Florida. Composed of highly permeable limestone and sand mainly of Pleistocene age, the aquifer supplies large quantities of water, of excellent quality except for hardness, for municipal, industrial, and irrigational use. The aquifer attains its maximum thickness in the Atlantic coastal areas and wedges out in western Dade and Broward counties.

Water-table conditions prevail in the Biscayne aquifer, and the water table fluctuates with variations in rainfall, evapotranspiration, and pumping. High ground-water levels occur during the fall months and low levels during spring and early summer. The highest water levels of record occurred in October 1947, when intense rainfall accompanying a hurricane flooded large areas throughout the two counties. Major discharge from the aquifer occurs by natural outflow and evapotranspiration. The average daily pumpage from the Biscayne aquifer in 1950 is estimated to have been 130 million gallons.

Permeability tests show that the limestones of the Biscayne aquifer rank among the most productive aquifers ever investigated by the U. S. Geological Survey.

Salt-water encroachment in the aquifer has taken place in coastal areas of southeastern Florida. The greatest inland advance of salt-water intrusion has occurred as tongues along tidal drainage canals and rivers.

INTRODUCTION

LOCATION AND GEOGRAPHY OF AREA

Dade and Broward counties are in southeastern Florida, bordering the Atlantic Ocean (fig. 1). The Atlantic Coastal Ridge, whose average elevation is between 8 and 10 feet above mean sea level, occupies the eastern portion of the area from the coast to a few miles inland. Maximum elevations at isolated highs range from 20 to 25 feet above sea

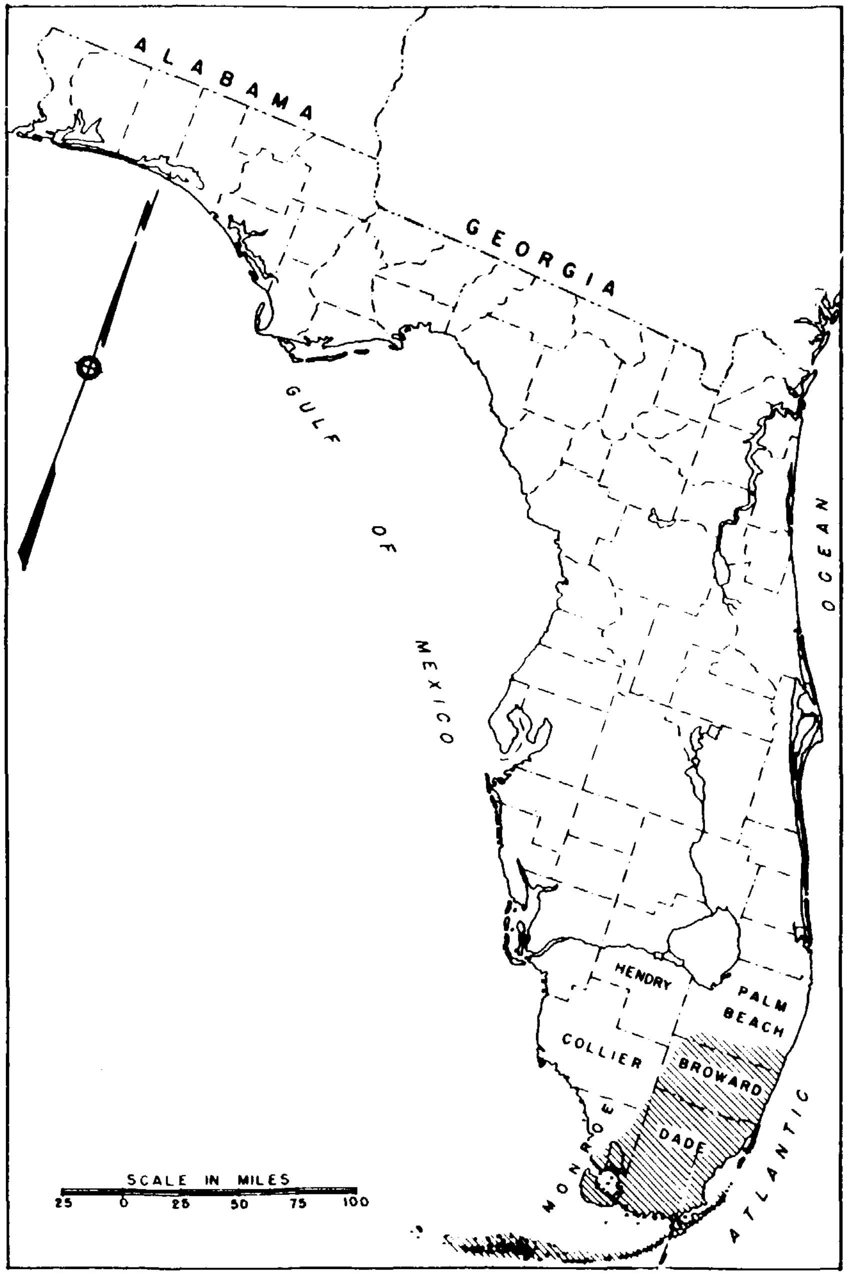


Figure 1. Map of Florida showing location of Dade and Broward counties and the approximate extent (shaded area) of the Biscayne aquifer.

level. In Dade County the ridge is composed principally of limestone, but in Broward County it is composed of both sand and limestone. Most of the population in the two counties is concentrated in the coastal and ridge areas. The Florida Everglades, and area of organic soils, lies west of the ridge and is devoted chiefly to agriculture and conservation areas. The climate is semitropical to tropical. Rainfall averages 60 inches per year, about 75 percent of the total falling in the period from May through October. The average temperature is about 75°F.

PURPOSE AND SCOPE OF INVESTIGATION

The ground-water resources of Dade and Broward counties are one of the greatest natural assets of the region. This report describes the geology and hydrologic characteristics of the Biscayne aquifer and defines its geographic distribution. The factors involved in the adequacy of the supply are discussed and an evaluation of data on fluctuations in water level is presented.

PREVIOUS INVESTIGATIONS

The surface geology in Dade and Broward counties was first investigated by Sanford (1909). Sellards (1919) added considerable data when the drainage canals were cut across the Everglades. The geologic formations in southern Florida were described by Cooke and Mossom (1929). Matson and Sanford (1913), Parker (1942), and Parker and others (1944) described the geology and occurrence of water in the water-table (Biscayne) aquifer. Parker and Cooke (1944) presented physiographic and geologic descriptions of southern Florida, with special reference to the late Cenozoic material in southeastern Florida. The major part of the aquifer was then identified as belonging to the Tamiami formation. Parker (1951) proposed the name Biscayne aquifer for the shallow materials and revised the geologic correlations of the formations in the aquifer. A report by Parker, Ferguson, Love, and others (1955) presents hydrologic data on the Biscayne aquifer in greater detail than does this report.

Data on fluctuations of water levels in wells in Dade and Broward counties have been reported in the following U. S. Geological Survey Water-Supply Papers for the years 1939-1952 inclusive: 886, 907, 937, 945, 987, 1017, 1024, 1072, 1097, 1127, 1157, 1166, 1192, and 1222. Subsequent data will be published in the water-supply papers entitled "Water Levels and Artesian Pressures in Observation Wells in the United States, Part 2, Southeastern States."

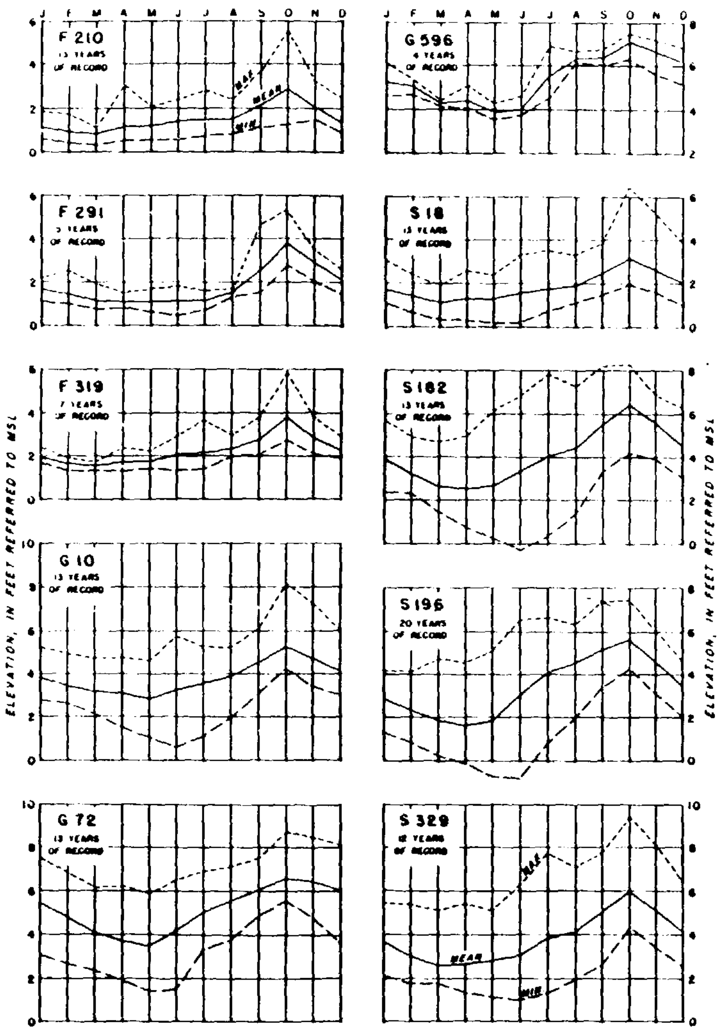


Figure 12. Chart of comparative average monthly water levels in selected wells.

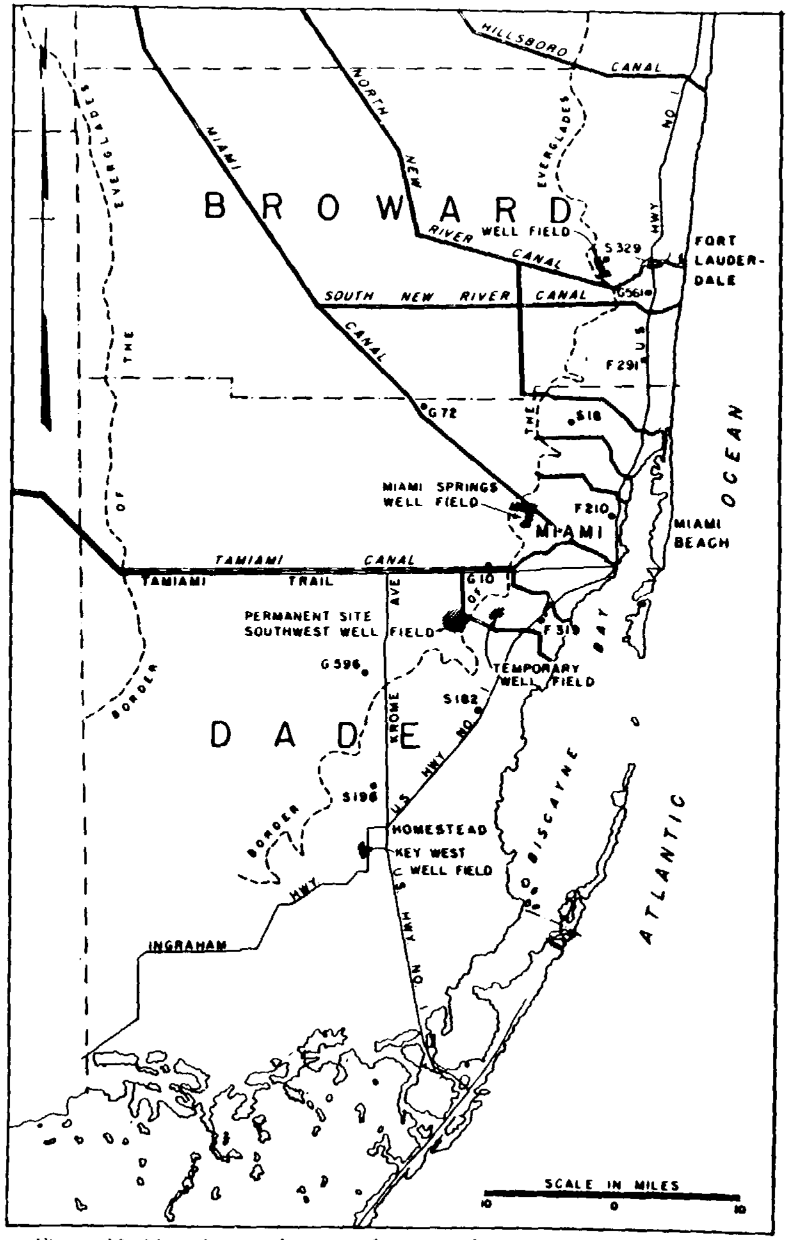


Figure 13. Map showing location of certain observation wells and locations of large municipal well fields.

hurricane on October 11, 12 resulted in water levels reaching what are probably the highest stages that have occurred since the major Everglades canals were completed in 1913.

Rainfall at representative stations in southern Florida ranged as follows:

January 1-October 30, 1947	65.9 to 96.1 inches
June 1-October 30, 1947	50.0 to 74.2 inches
Normal yearly rainfall	53.8 to 62.6 inches

Rainfall on October 11 ranged from 5 to 15 inches and averaged about 10 inches in northern Dade County.

Practically the entire area west of the coastal ridge that was not already flooded became inundated, and the already large overland flow south in the Everglades was increased. The Miami Canal was out of its banks as far east as Hialeah and Miami Springs. Outflow across U. S. Highway 27 occurred from a mile northwest of Pennsuco to the vicinity of the Russian Colony Canal. Other canals were similarly out of their banks. The actual peak lasted several hours at the most, although many areas remained flooded for several weeks.

The water-level map for October 11, 12 showing the peak (fig. 16) was prepared from records of observation wells equipped with recorders, and from measurements made during the flood period, leveled measurements of flood marks, and interpolation of the measurements made in a large number of wells on or about October 7. In a few places the water levels are estimated. However, the map is believed to be a good approximation of actual conditions. In the area between Snapper Creek and Krome Avenue, south of the Tamiami Canal, the presence of several small ground-water mounds and the network of canals make it difficult to visualize the actual shape of the water table, but the general slope was as indicated.

RECHARGE AND DISCHARGE

Local rainfall is the principal source of recharge to the Biscayne aquifer. The amount of rainfall varies within relatively short distances, but it averages about 60 inches annually in Dade County. In Broward County, rainfall records for periods ranging from 5 to 25 years indicate an average annual rainfall ranging from 51 to 65 inches. The lower averages commonly pertain to the Everglades, and the higher ones to the c stal ridge.

mall amount of ground water moves into the aquifer in Broward n Palm Beach County and from the North New River Canal. canals are controlled by dams and in areas where the are lowered by pumping, as in the well field in Miami ide recharge to the Biscayne aquifer.

p. 519-524) and as reported by Parker (Parker, Ferguson, Love, and others, 1955, p. 239-274) are summarized in the following table (see fig. 14 for location of test sites).

Test site	*Range in computed coefficient of transmissibility (gpd/ft)* Lowest	Highest
S 1	3,250,000	4,300,000
G 551	9,000,000	14,000,000
G 552	2,800,000	5,700,000
G 553	2,500,000	3,900,000
G 218	3,900,000	4,400,000

At all the test sites the Miami oolite forms the upper part of the Biscayne aquifer, and at most of them it is underlain by a bed of sand. The permeability of the oolite and sand is lower than that of the underlying cavernous limestone of the Fort Thompson formation and thus acts as a leaky roof during the pumping of a well, and the formation initially acts as an artesian aquifer. The Bessel function then can be used in the computations using formulas developed by Jacob (1945, p. 198-208). John G. Ferris (1950, personal communication) determined the following values from the test data:

Well No.	*Coefficient of transmissibility (gpd/ft)*
S 1	3,200,000
G 551	9,700,000
G 552	3,200,000
G 553	3,200,000

The T value of the test for well G 551 by both calculations is inconsistent with the values for the other tests. The results of the other three tests using the Bessel function are extraordinarily consistent considering the character of the aquifer. The permeability of the Biscayne aquifer probably averages between 50,000 and 70,000 gallons per day per square foot, according to Parker (1951). No satisfactory computation of the storage coefficient has yet been obtained.

Several assumptions concerning the aquifer must be applied in using formulas to determine these coefficients: (1) the aquifer is homogeneous and isotropic and transmits water with equal readiness in all directions; (2) the discharging well penetrates the entire thickness of the aquifer; (3) there is no turbulent flow within the aquifer, and during the pumping there is no vertical convergence of flow lines toward the pumped well; and (4) water is discharged from storage instantaneously with reduction in head.

REFERENCE # 21

STATE OF FLORIDA
DEPARTMENT OF NATURAL RESOURCES
Tom Gardner, *Executive Director*

DIVISION OF RESOURCE MANAGEMENT
Jeremy A. Craft, *Director*

FLORIDA GEOLOGICAL SURVEY
Walter Schmidt, *State Geologist*

BULLETIN NO. 59

THE LITHOSTRATIGRAPHY OF THE HAWTHORN GROUP (MIOCENE) OF FLORIDA

By
Thomas M. Scott

Published for the
FLORIDA GEOLOGICAL SURVEY
TALLAHASSEE
1988

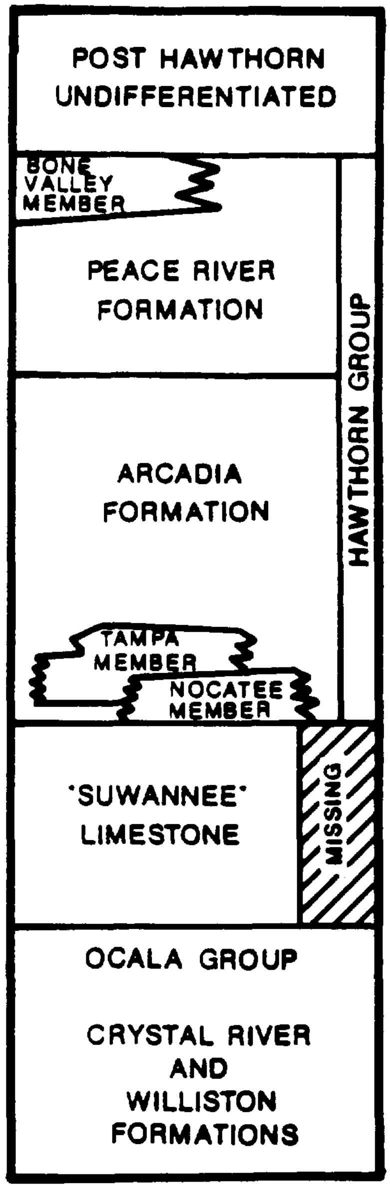


Figure 33. Lithostratigraphic units of the Hawthorn Group in southern Florida.

SOUTH FLORIDA

Although the Hawthorn Group in south Florida consists of the same general sediment types (carbonate, quartz sand, clay and phosphate), the variability and complexity of the section is different from the strata in northern Florida. In the south Florida area (Figure 1), particularly the western half of the area, the Hawthorn Group consists of a lower, predominantly carbonate unit and an upper, predominantly siliciclastic unit. Eastward the section becomes more complex due to a greater percentage of siliciclastic beds present in the lower portion of the Hawthorn Group.

The differences that exist between the northern and southern sections of the Hawthorn Group require separate formational nomenclature. In southern Florida, the Hawthorn Group consists of in ascending order, the Arcadia Formation (new name) with the Tampa and Nocatee (new name) Members and the Peace River Formation (new name) with the Bone Valley Member (Figure 33). The new nomenclature helps alleviate many of the previously existing problems associated with the relationship of the Bone Valley, Tamiami, Hawthorn, and Tampa units in the south Florida region.

ARCADIA FORMATION

Definition and Type Section

The Arcadia Formation is a new formational name proposed here for the lower Hawthorn carbonate section in south Florida. This unit includes sediments formerly assigned to the Tampa Formation or Limestone (King and Wright, 1979) and the "Tampa sand and clay" unit of Wilson (1977).

Dall and Harris (1892) used the term "Arcadia marl" to describe beds along the Peace River. This term was never widely used and did not appear in the literature again except in reference to Dall and Harris. It appears that their use of the "Arcàdia marl" described a carbonate bed now belonging in the Peace River Formation of the upper Hawthorn Group. Riggs (1967) used the term "Arcadia formation" for the carbonate beds often exposed at the bottom of the phosphate pits in the Central Florida Phosphate District. Riggs' use of this name was never formalized. The "Lexicon of Geologic Names" (U.S.G.S., 1966) listed the name Arcadia as being used as a member of the Cambrian Trempealeau Formation in Wisconsin and Minnesota, thereby precluding its use elsewhere. Investigations into the current status of this name indicated that the Arcadia member has not been used in some 25 years and does not fit the current Cambrian stratigraphic framework. The Lexicon also indicates Arcadia clays as an Eocene (Claibornian) unit in Louisiana. This name also has been dropped from the stratigraphic nomenclature of Louisiana (Louisiana Geological Survey, 1984, personal communication). Since these former usages of this name are no longer viable, the term can be used for the lower Hawthorn Group sediments in southern Florida in accordance with Article 20 of the North American Code of Stratigraphic Nomenclature (NACSN, 1983).

The Arcadia Formation is named after the town of Arcadia in DeSoto County, Florida. The type section is located in core W-12050, Hogan #1, DeSoto County (SE¼, NW¼, Section 16, Township 38S, Range 26E, surface elevation 62 feet (19 meters)) drilled in 1973 by the Florida Geological Survey. The type Arcadia Formation occurs between -97 feet MSL (-30 meters MSL) to -520 feet MSL (-159 meters) (Figure 34).

Two members can be recognized within the Arcadia Formation in portions of south Florida. These are the Tampa Member and the Nocatee Member (Figure 33). The members are not recognized throughout the entire area. When the Tampa and Nocatee are not recognized, the section is simply referred to as the Arcadia Formation.

Lithology

The Arcadia Formation, with the exception of the Nocatee Member, consists predominantly of limestone and dolostone containing varying amounts of quartz sand, clay and phosphate grains. Thin beds of quartz sand and clay often are present scattered throughout the section. These thin sands and clays are generally very calcareous or dolomitic and phosphatic. Figure 34 graphically illustrates the lithologies of the Arcadia Formation including the Tampa and Nocatee Members. The lithologies of the

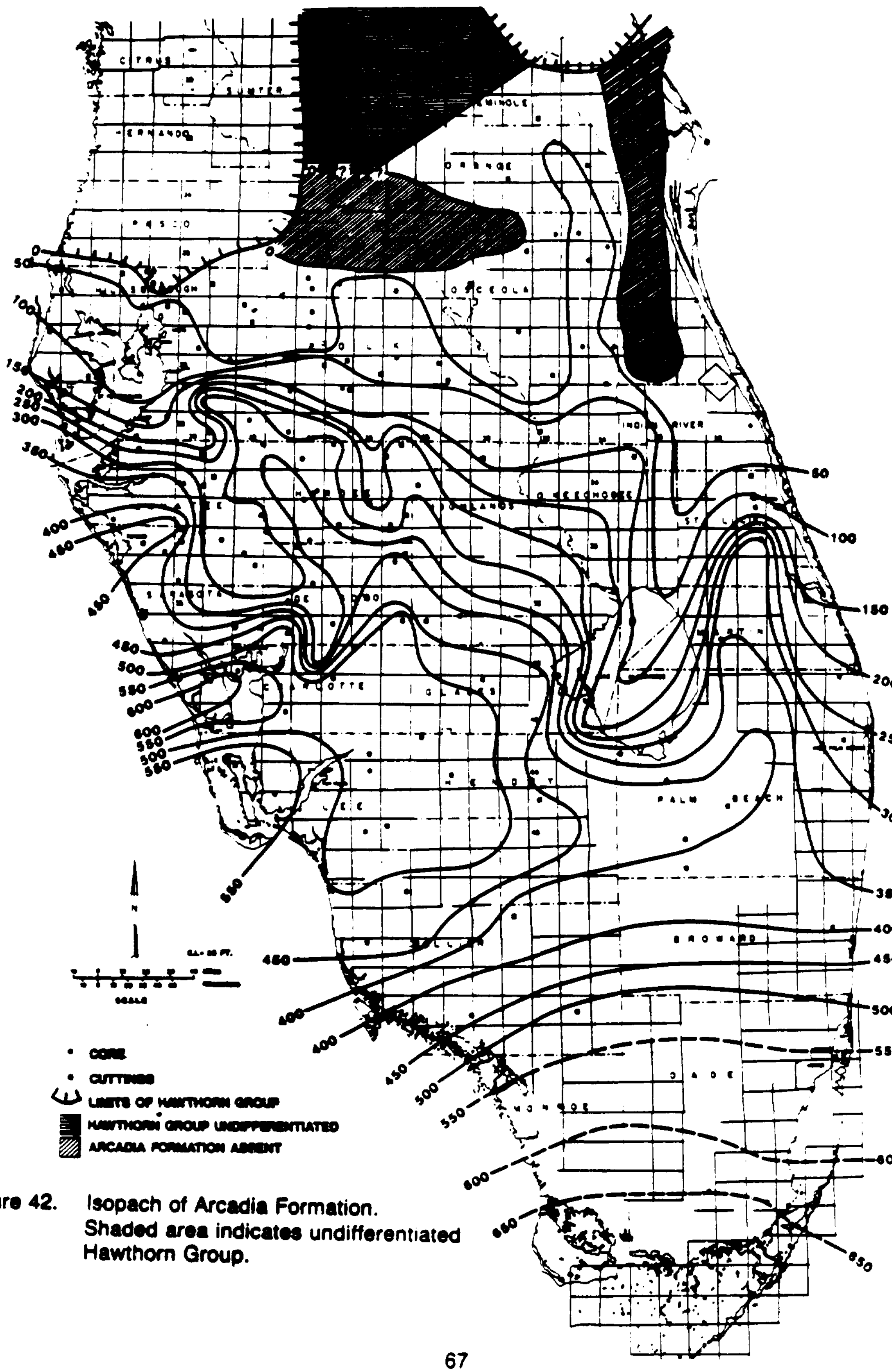


Figure 42. Isopach of Arcadia Formation. Shaded area indicates undifferentiated Hawthorn Group.

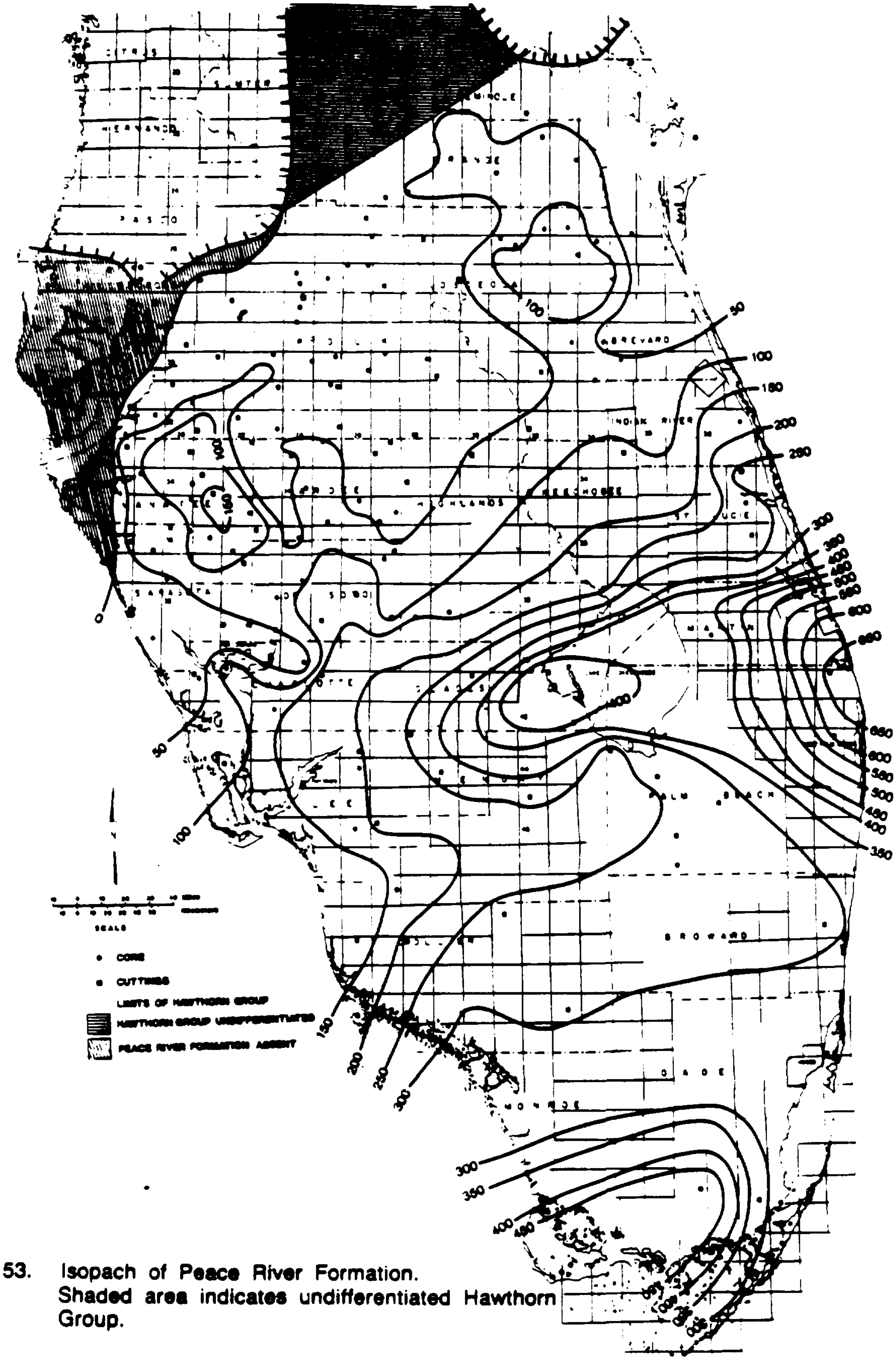
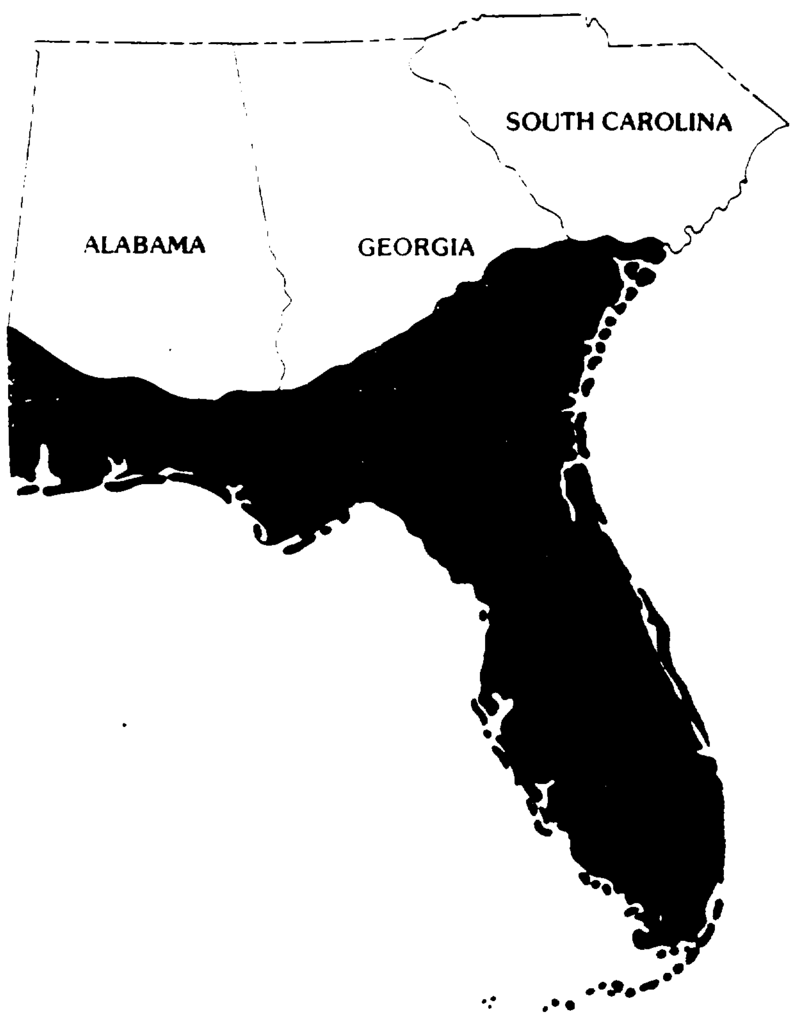


Figure 53. Isopach of Peace River Formation. Shaded area indicates undifferentiated Hawthorn Group.

SUMMARY OF THE HYDROLOGY OF THE FLORIDAN AQUIFER SYSTEM IN FLORIDA AND IN PARTS OF GEORGIA, SOUTH CAROLINA, AND ALABAMA

REFERENCE # 22



U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403-A

Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama

By RICHARD H. JOHNSTON *and* PETER W. BUSH

REGIONAL AQUIFER-SYSTEM ANALYSIS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403-A

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1988

TABLE 1.—*Terminology applied to the Floridan aquifer system*

SERIES/STAGE		PARKER AND OTHERS (1955)		SPRINGFIELD (1966)		MILLER (1982b, 1982d)		MILLER (1986)	
		Formations[1]	Aquifer	Formations[1]	Aquifer	Formations[1]	Aquifers	Formations[1]	Aquifers
MIOCENE		Hawthorn Formation	Where permeable	Hawthorn Formation		Hawthorn		Hawthorn	
MIOCENE		Tampa Limestone	Floridan aquifer	Tampa Limestone	Principal artesian aquifer	Tampa Limestone	Where permeable	Tampa Limestone	Where permeable
OLIGOCENE		Suwannee Limestone	Floridan aquifer	Suwannee Limestone	Principal artesian aquifer	Suwannee Limestone	Tertiary limestone aquifer system	Suwannee Limestone	Floridan aquifer system
EOCENE	Upper	Ocala Limestone	Floridan aquifer	Ocala Limestone	Principal artesian aquifer	Ocala Limestone	Tertiary limestone aquifer system	Ocala Limestone	Floridan aquifer system
EOCENE	Middle	Avon Park Limestone Lake City Limestone	Floridan aquifer	Avon Park Limestone Lake City Limestone	Principal artesian aquifer	Avon Park Limestone Lake City Limestone	Tertiary limestone aquifer system	Avon Park Formation	Floridan aquifer system
EOCENE	Lower			Oldsmar Limestone	Principal artesian aquifer	Oldsmar Limestone	Tertiary limestone aquifer system	Oldsmar Formation	Floridan aquifer system
PALEOCENE						Cedar Keys Limestone	Tertiary limestone aquifer system	Cedar Keys Formation	Floridan aquifer system

[1] Names apply only to peninsular Florida and southeast Georgia except for Ocala Limestone and Hawthorn Formation.

greater than that of those rocks that bound the system above and below. As shown in table 1, the Floridan includes units of Late Paleocene to Early Miocene age. Locally in southeast Georgia, the Floridan includes carbonate rocks of Late Cretaceous age (not shown in table 1). Professional Paper 1403–B presents a detailed geologic description of the Floridan, its component aquifers and confining units, and their relation to stratigraphic units.

The top of the Floridan aquifer system represents the top of highly permeable carbonate rock that is overlain by low-permeability material—either clastic or carbonate rocks. Throughout much of the area, this upper confining unit consists largely of argillaceous material of the Miocene Hawthorn Formation (table 1). Similarly the base of the Floridan is that level below which there is no high-permeability rock. Generally the underlying low-permeability rocks are either fine-grained clastic materials or bedded anhydrite. These sharp permeability contrasts at the top and base of the Floridan commonly occur within a formation or a time-stratigraphic unit as described by Miller (1986).

AQUIFERS AND CONFINING UNITS

The Floridan aquifer system generally consists of an Upper Floridan aquifer and a Lower Floridan aquifer, separated by less-permeable beds of highly variable properties termed the middle confining unit (Miller, 1986, p. B53). In parts of north Florida and southwest Georgia, there is little permeability contrast within the aquifer system. Thus in these areas the Floridan is effectively one continuous aquifer. The upper and lower aquifers are defined on the basis of permeability, and their boundaries locally do not coincide with those of either time-stratigraphic or rock-stratigraphic units. The relations among the various aquifers and confining units and the stratigraphic units that form them are shown on plate 1, a fence diagram modified from Miller (1986, pl. 30). A series of structure contour maps and isopach maps for the aquifers as well as the seven principal stratigraphic units that make up the Floridan aquifer system and its contiguous confining units is presented in Professional Paper 1403–B. These maps and associated cross sections were prepared by Miller (1986) based on geophysical logs, lithologic descriptions of cores and cuttings, and faunal data for the stratigraphic units, plus hydraulic-head and aquifer-test data for the hydrogeologic units.

The fence diagram shows the Floridan gradually thickening from a featheredge at the outcrop area of Alabama-Georgia-South Carolina to more than 3,000 ft in southwest Florida. Its maximum thickness is about 3,500 ft in the Manatee-Sarasota County area of southwest Florida. In and directly downdip from much of the outcrop area, the Floridan consists of only one permeable unit. Further downdip in coastal Georgia and much of Florida, the Upper and Lower Floridan aquifers become prominent hydrogeologic units where they are separated by less-permeable rocks.

Overlying much of the Floridan aquifer system are low-permeability clastic rocks that are termed the upper confining unit. The lithology, thickness, and integrity of this confining unit has a controlling effect on the development of permeability in the Upper Floridan and the ground-water flow in the Floridan locally. (See later sections on transmissivity and regional ground-water flow.)

Plate 2 shows where the Upper Floridan is unconfined, semiconfined, or confined. Actually the Upper Floridan rarely crops out, and there is generally either a thin surficial sand aquifer or clayey residuum overlying the Upper Floridan. Sinkholes are common in the unconfined and semiconfined areas and provide hydraulic connection between the land surface and the Upper Floridan. In the semiconfined and confined areas, the upper confining unit is mostly the middle Miocene Hawthorn Formation, which consists of interbedded sand and clay that are locally phosphatic and contain carbonate beds. In southwest Florida, the carbonate beds locally form aquifers. Professional Papers 1403–E and 1403–F discuss these local aquifers in detail.

There are two important surficial aquifers overlying the upper confining unit locally: (1) the fluvial sand-and-gravel aquifer in the westernmost Florida panhandle and adjacent Alabama and (2) the very productive Biscayne aquifer (limestone and sandy limestone) of southeast peninsular Florida. Both of these aquifers occur in areas where water in the Floridan is saline; hence they are important sources of freshwater.

The Upper Floridan aquifer forms one of the world's great sources of ground water. This highly permeable unit consists principally of three carbonate units: the Suwannee Limestone (Oligocene), the Ocala Limestone (upper Eocene), and the upper part of the Avon Park Formation (middle Eocene). Detailed local descriptions of the geology and hydraulic properties of the Upper Floridan are provided in many reports listed in the references and especially in the summary by Stringfield (1966). The hydraulic properties section of this report discusses the large variation in transmissivity (as many as three orders of magnitude) within the Upper Floridan. Professional Paper 1403–B discusses the geologic reasons for these variations.

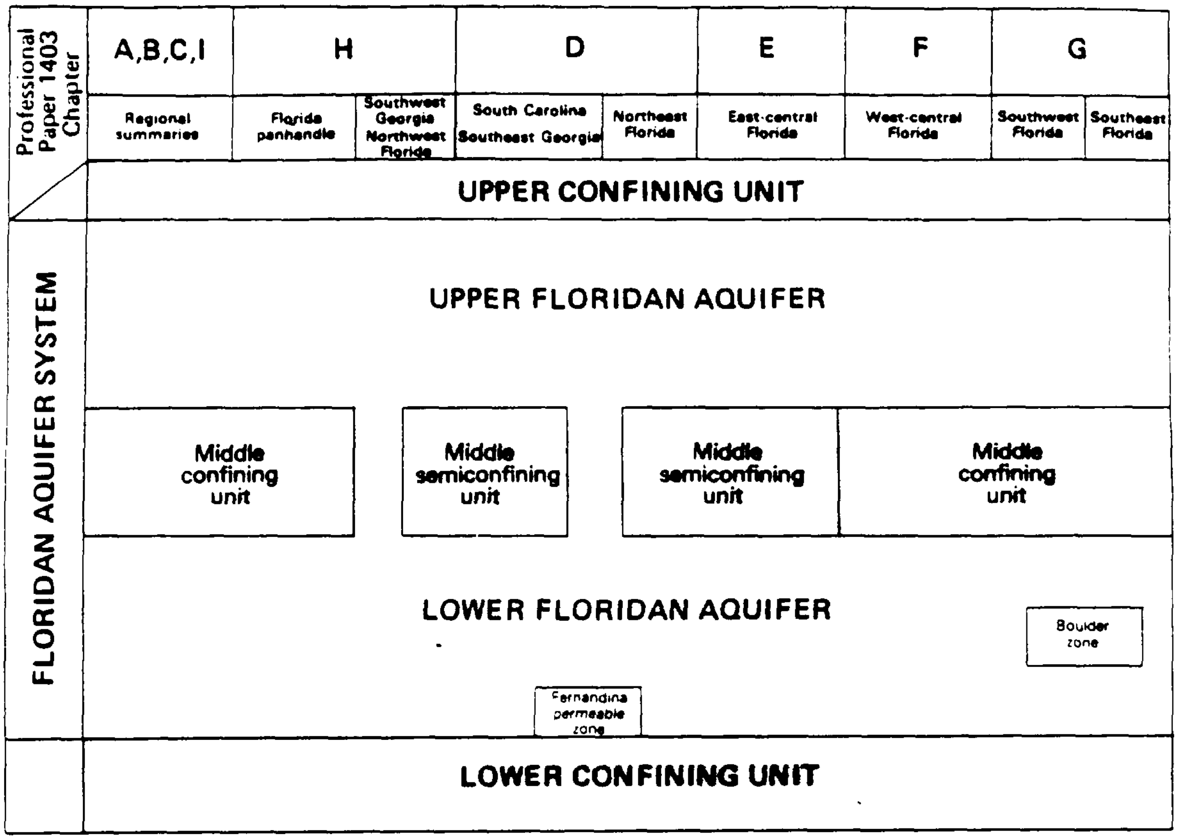
Within the Upper Floridan aquifer (and the Lower Floridan where investigated) there are commonly a few highly permeable zones separated by carbonate rock whose permeability may be slightly less or much less than that of the high-permeability zones. Many local studies of the Floridan have documented these permeability contrasts, generally by use of current-meter traverses in uncased wells. For example, Wait and Gregg (1973) observed that wells tapping the Upper Floridan in the Brunswick, Ga., area obtained about 70 percent of their water from (approximately) the upper 100 ft of the Ocala Limestone and about 30 percent from a zone near the base of the Ocala. Separating the two zones is about 200 ft of less-permeable carbonate rock. Leve (1966) described permeable zones of soft limestone and dolomite and less-permeable zones of hard massive dolomite in the Upper Floridan of northeast Florida.

The Upper and Lower Floridan aquifers are separated by a sequence of low-permeability carbonate rock of mostly middle Eocene age. This sequence, termed the middle confining unit, varies greatly in lithology, ranging from dense gypsiferous limestone in south-central Georgia to soft chalky limestone in the coastal strip from South Carolina to the Florida Keys. Seven subregional units have been identified and mapped as part of the middle confining unit (see detailed descriptions in Professional Paper 1403–B). Much of the middle confining unit consists of rock formerly termed Lake City Limestone but referred to here as the lower part of the Avon Park Formation (table 1).

The Lower Floridan aquifer is comparatively less known geologically and hydraulically than the Upper Floridan. Much of the Lower Floridan contains saline water. For this reason and because the Upper Floridan is so productive, there is little incentive to drill into the deeper Lower Floridan in most areas. The Lower Floridan consists largely of middle Eocene to Upper Paleocene carbonate beds, but locally in southeast Georgia also includes uppermost Cretaceous carbonate beds. There are two important permeable units within the Lower Floridan: (1) a cavernous unit of extremely high permeability in south Florida known as the Boulder zone and (2) a partly cavernous permeable unit in northeast Florida and southeast coastal Georgia herein termed the Fernandina permeable zone. These units are further described in Professional Papers 1403–G and 1403–D, respectively.

Table 2 summarizes the geographic occurrence of aquifers and confining units within the Floridan aquifer system and shows the hydrogeologic nomenclature used in each Professional Paper. The units given in the table are hydraulic equivalents intended for use in describing and simulating the regional flow system. No stratigraphic equivalency or thickness connotation is intended in this table. For example, the Upper Floridan aquifer in the western Florida panhandle consists principally of the Suwannee (Oligocene) Formation. However, in central Florida the Ocala and Avon Park Formations constitute much of the high-permeability rock in the Upper Floridan.

TABLE 2.—*Aquifers and confining units of the Floridan aquifer system*



HYDRAULIC PROPERTIES OF THE AQUIFER SYSTEM

The permeability of the Floridan varies greatly because of differences in the character of its water-bearing materials. These materials include: (1) detrital units of foraminiferal remains and coarse sand-sized particles that hydraulically act as sand or gravel; (2) micritic limestone in the Florida panhandle that acts hydraulically as silt or clay; (3) networks of many small solution openings along joints or bedding planes that on a gross scale provide a uniform distribution of permeability; and (4) large cavernous openings developed in karst or paleokarst areas. In areas where the Floridan is characterized by the first three types, diffuse flow predominates; however, in areas with large cavernous openings, conduit flow predominates.

For the areas where diffuse flow predominates, the methods of aquifer-test analysis developed for porous media are applicable. The response curves of aquifer tests outside the karst terrains generally match the classic nonleaky, leaky, or delayed-yield type curves. Many tests in the confined areas are characterized by a Theis (nonleaky) response throughout nearly the entire test duration. In contrast, porous-media flow theory cannot be applied, at least on a local scale, in the karst areas where conduit flow predominates. However, on a regional scale, analyses of the ground-water flow system using flow nets and "coarse-mesh" digital models have been done successfully in the karst areas, as discussed in Professional Papers 1403-C through H.

TRANSMISSIVITY

The transmissivity of the Upper Floridan aquifer varies by more than three orders of magnitude as a result of the wide variation in hydrogeologic conditions. The conditions that most affect transmissivity are the degree of solution development in the aquifer and, to a lesser extent, the aquifer thickness. High transmissivities usually occur in the areas having less confinement because circulation of flow helps to develop solution openings in the aquifer. Table 3 illustrates the combinations of these hydrogeologic characteristics that produce the variations in transmissivity for the geographic areas underlain by the Upper Floridan.

TABLE 3.—*Transmissivity and hydrogeologic conditions of the Upper Floridan aquifer and the upper confining unit in various localities*

LOCALITY		TRANSMISSIVITY (feet squared per day)	UPPER FLORIDAN AQUIFER				UPPER CONFINING UNIT		
			Thick		Thin (less than 200 feet)		Thick	Thin (less than 100 feet)	
			Solution cavities		Solution cavities		Some clayey beds	Clayey	Sandy or breached
			Minor	Major	Minor	Major			
Western Florida panhandle		1000 - 25,000	■				▒		
Southwest Georgia (Dougherty Plain)		10,000 - 200,000			▒	▒			
Florida, south of Lake Okeechobee		10,000 - 60,000	■				▒		
Savannah, Georgia, to Jacksonville, Florida, coastal area		25,000 - 250,000	■				▒		
Central Florida, northern Florida, and adjacent Georgia	Major springs area	Greater than 1,000,000		■					▒
	Elsewhere	Mostly 20,000 - 250,000 locally 250,000 - 1,000,000	■	■			▒	▒	

The low values of transmissivity (less than 50,000 ft²/d) occur in the Florida panhandle and southernmost Florida (where the aquifer is confined by thick clay sections and contains thick sections of low-permeability limestone) and in the updip areas of Alabama, Georgia, and South Carolina (where the aquifer is thinnest). Transmissivities are highest (greater than 1,000,000 ft²/d) in the karst areas of central and northern Florida, where the aquifer is generally unconfined or semiconfined.

The areal distribution of transmissivity of the Upper Floridan aquifer is shown on figure 2. The map portrays the most probable ranges of transmissivity based on values derived from 114 aquifer tests, computer simulation, and geology. A tabulation of the aquifer tests, including method of analysis and source of test data, is presented in Professional Paper 1403–C. At sites where test wells are fully penetrating, the field-test values and the model-derived values generally are in agreement. However, where test wells do not fully penetrate the Upper Floridan, the field-test values are generally less than the model-derived numbers. The field-test data tend to be concentrated in the areas of heavy withdrawals. Where there has been little or no ground-water development, the transmissivity estimates used to prepare figure 2 are based primarily on model calibration. This includes the area of very large spring flows in central and northwest Florida. Within this area, simulation indicates transmissivities ranging from 250,000 ft²/d to as much as 10,000,000 ft²/d. An appraisal of the reliability of the transmissivity map based on the availability of aquifer-test data and the sensitivity of a regional flow model to transmissivity is presented in Professional Paper 1403–C.

The distribution of transmissivity shown on figure 2 is closely related to the degree of confinement of the Upper Floridan. Comparison of figure 2 with plate 2, which shows confined and unconfined conditions for the Upper Floridan, indicates that the confined areas generally have lower transmissivity than semiconfined or unconfined areas. All of the very high transmissivity area (greater than 1,000,000 ft²/d) and much of the high-transmissivity area (250,000 to 1,000,000 ft²/d) occurs where the aquifer is either unconfined or semiconfined.

The very high transmissivity areas are characterized by the extensive development of solution features in the carbonate rock. The development of these features is related to the geologic history, and is discussed further in Professional Paper 1403–B and has been described in detail by Stringfield (1966). Where there is extensive karst development, the permeability distribution is extremely complex, with marked differences in transmissivity occurring in short distances. For example in a flow-net analysis of the Silver Springs drainage area, Faulkner (1973, p. 95) calculated transmissivities varying by more than three orders of magnitude: 11,000 to 25,000,000 ft²/d for individual cells within the 92-mi² area of his flow net.

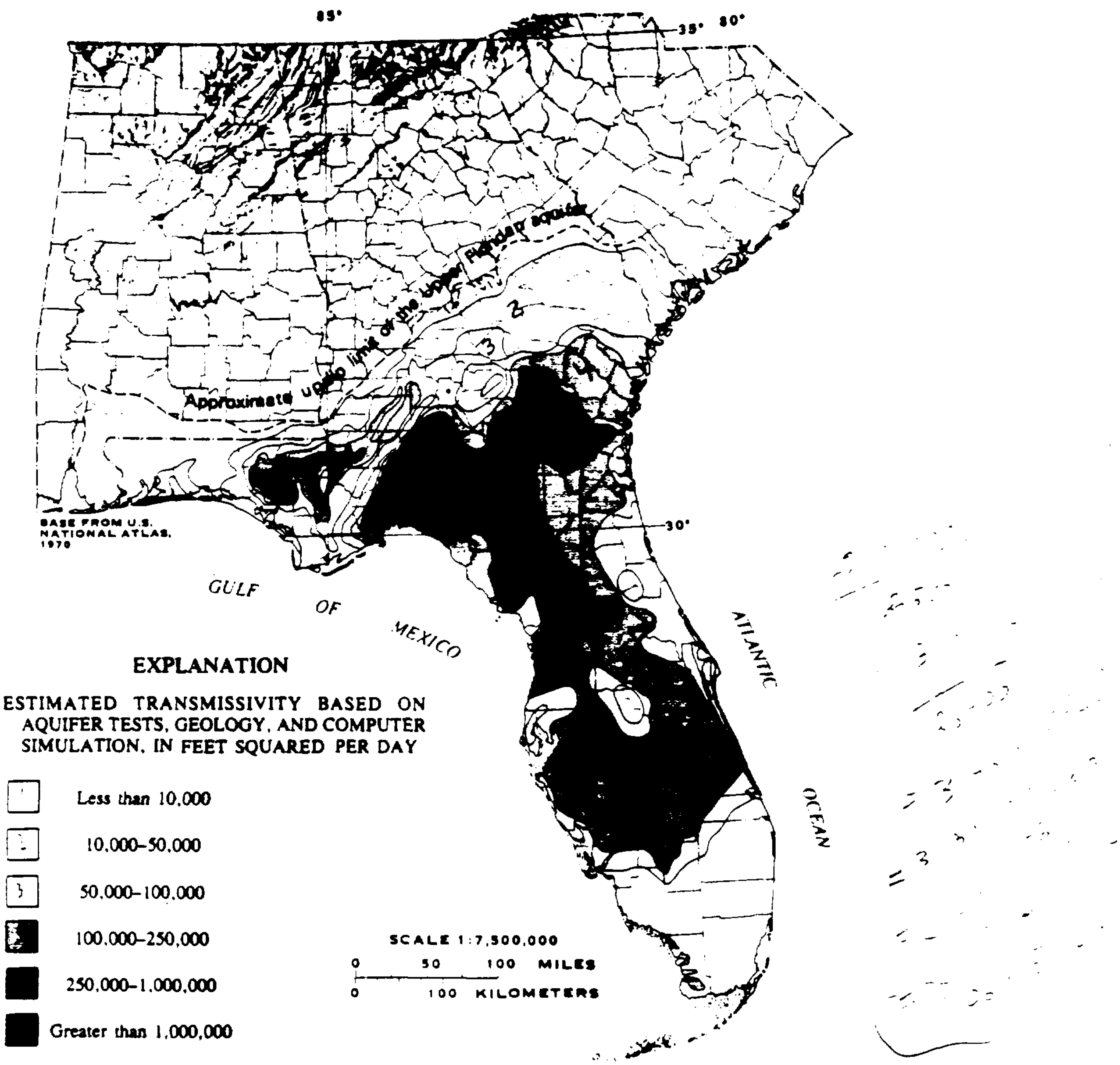


FIGURE 2.—Transmissivity of the Upper Floridan aquifer.

The low values of transmissivity (less than 50,000 ft^2/d) occur in the Florida panhandle, southernmost Florida, and the updip areas of Alabama, Georgia, and South Carolina. In the updip areas, the decreased transmissivity results simply from thinning of the aquifer. However, the development of karst in the outcrop area of southwest Georgia causes a sharp increase in transmissivity just downdip from the featheredge of the aquifer. The low transmissivity in the thick downdip sections of the Florida panhandle and southernmost Florida results from facies changes in the carbonate rock. As discussed in Professional Paper 1403-B, the aquifer in these areas contains large amounts of micritic limestone that has very low permeability.

Areal variations in the transmissivity of the Lower Floridan aquifer cannot be defined because of a lack of aquifer test data. The digital flow models provided little basis for improving initial estimates of transmissivity, inasmuch as the models were insensitive to changes in transmissivity of the Lower Floridan. In southeast Florida, the Lower Floridan contains a cavernous unit termed the "Boulder zone" (pl. 1) that is increasingly being used for injection of treated sewage and industrial wastes. Aquifer tests in the Boulder zone suggest a transmissivity in excess of 3,000,000 ft^2/d (Meyer, 1974; Singh and others, 1983).

STORAGE COEFFICIENT

The storage coefficients calculated from aquifer tests for the Upper Floridan range from a low of 1×10^{-5} to a high of 2×10^{-2} with most values in the 1×10^{-3} to 1×10^{-4} range. In the Floridan aquifer system, reported storage coefficients bear no discernible relation to thickness of aquifer tested on a regional basis. The higher values, 1×10^{-2} to 1×10^{-3}, reflect the semiconfined nature characteristic of some parts of the system, such as southwest Georgia, where the aquifer is very close to land surface. The higher values indicate that some of the water from aquifer storage comes from dewatering of the aquifer rather than totally from compression of the aquifer skeleton and expansion of water. Where the confining unit on the Upper Floridan is thin or nonexistent, the Upper Floridan together with the surficial sand aquifer overlying it can behave as a single aquifer. The response to pumping may involve dewatering only in the overlying sands or it may also involve dewatering of the Upper Floridan depending upon pumping rates.

The areal distribution of the storage coefficient of the Upper Floridan could not be developed from transient simulation due to the lack of steady-state initial conditions and historical pumping and associated water-level data. However, transient simulation provided insight into the relative importance of storage in different hydrogeologic areas. Depending on hydrogeologic conditions and the estimated value of storage coefficient, the time required from the start of a new pumping period for the system to reach a new steady-state condition can range from days to years. The time needed from the start of a new pumping period for the system to reach steady state in confined areas depends on the fraction of water pumped that must come from aquifer storage. If the water necessary to sustain a given pumping rate is readily available from vertical leakage (induced recharge) or from adjacent areas within the aquifer (diversion of natural discharge), then only a small part of the water pumped will come from aquifer storage, and a steady-state condition will be achieved relatively quickly. Thus, leaky, high-transmissivity areas are relatively quick to reach equilibrium, and conversely, tightly confined, low-transmissivity areas, which of necessity are more dependent on water from aquifer storage when pumped, are relatively slow to reach equilibrium.

The difference in time required to reach equilibrium can be illustrated by contrasting the aquifer's response to pumping in a low-transmissivity, tightly confined area near Fort Walton Beach, Fla. (where transmissivity and leakage coefficient are 2,000 ft^2/d and 5.4×10^{-7} per day, respectively) with a more transmissive, less tightly confined area in Polk County, Fla. (where transmissivity and leakage coefficient are 130,000 ft^2/d and 2.8×10^{-5} per day, respectively). Simulation shows a relatively low dependence on water from aquifer storage in Polk County, whereas proportionately much more water must come from storage near Fort Walton Beach. Thus the system reaches steady state quickly (a few weeks) at Polk County but slowly (more than a year) near Fort Walton Beach.

LEAKAGE COEFFICIENT

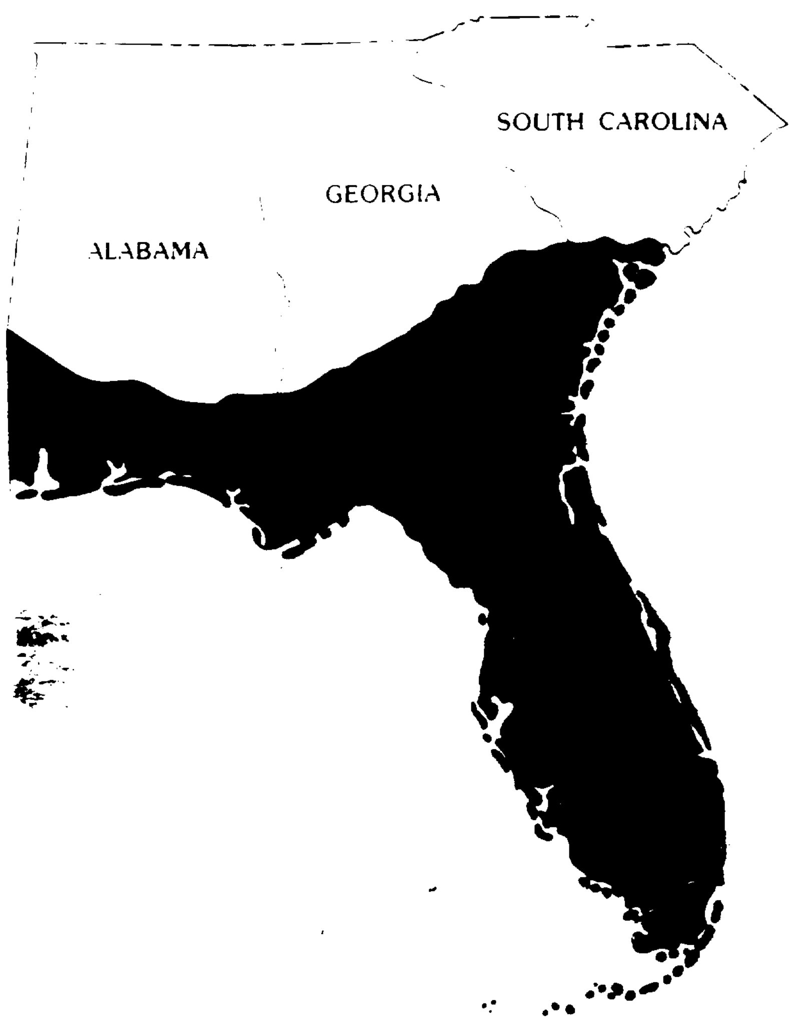
The leakage coefficient of the upper confining unit is highly variable, especially in the semiconfined areas where the confining beds may be either sandy or clayey. Leakage coefficient values of the upper confining unit derived from simulation range from less than 0.01 (in./yr)/ft in tightly confined areas to more than 1.00 (in./yr)/ft in semiconfined areas. The leakage coefficients calculated from aquifer-test data are in general very much larger than those obtained from simulation, ranging from 0.44 to 88 (in./yr)/ft.

In the majority of locations, leakage coefficients from aquifer-test data are too large to realistically represent the exchange of water between the surficial aquifer and the Upper Floridan. The values obtained from aquifer-test data can reflect not only downward leakage from the surficial aquifer, but upward leakage from permeable rocks beneath the pumped interval, as well as leakage from beds of relatively low permeability that might exist within the pumped interval. Upper-confining-unit leakage coefficients derived from Floridan aquifer-test data are composite, or lumped, properties that include leakage from all available sources. Wells in the Floridan aquifer system are usually partially penetrating and often intersect local low-permeability units. Thus in most Floridan test situations it is probable that leakage coefficients obtained from the test data will characterize leakage from all sources, not just downward leakage from the upper confining unit or the surficial aquifer. A map portraying the values of leakage coefficient required to deliver vertical flow between the surficial aquifer and the Upper Floridan aquifer during simulations is presented in Professional Paper 1403-C.

No quantitative field data on the water-transmitting characteristics of the middle confining unit exist. Miller (1986) used lithology and thickness to qualitatively assess the degree of confinement offered by each of

HYDROGEOLOGIC FRAMEWORK OF THE FLORIDAN AQUIFER SYSTEM IN FLORIDA AND IN PARTS OF GEORGIA, ALABAMA, AND SOUTH CAROLINA

REFERENCE # 23



U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403–B

Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina

By JAMES A. MILLER

REGIONAL AQUIFER-SYSTEM ANALYSIS

U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1403–B

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1986

the planktic foraminifer *Globorotalia pseudomenardii* Bolli, a worldwide Paleocene form. The generic placement of certain planktic species has recently been revised by some authors. For example, *Globorotalia pseudomenardii* is presently considered to belong to the genus *Planorotalites*; *G. subbotinae* and *G. velascoensis* are thought to belong to the genus *Morozovella*. These revisions, however, are not accepted by all micropaleontologists. The taxonomy used for planktic foraminifers in this report and the range of the different species follow Stainforth and others (1975). *Globorotalia pssudomenardii* has been reported (Oliver and Mancini, 1980) from marl beds in the lower part of the Tuscahoma Formation. Higher up in the Tuscahoma, other marl beds contain *G. velascoensis* (Cushman), a form usually shown on foraminiferal zonation charts as ranging into the latest Paleocene. The base of Eocene strata is considered by some authors to be the first occurrence of *G. subbotinae* Morozova (formerly called *G. rex* Martin). However, Oliver and Mancini (1980) recorded *G. subbotinae*, along with *G. velascoensis*, from the same beds in the upper part of the Tuscahoma. Stainforth and others (1975) showed that the range of *G. velascoensis* overlaps the entire range of *G. pseudomenardii* below, and slightly overlaps the range of *G. subbotinae* above.

In the subsurface strata examined during this study, *G. velascoensis* was found to occur commonly in the same beds with *G. pseudomenardii*; accordingly, beds that contain either of these species are considered to be of definite Paleocene age. Beds in the deep subsurface that contain *G. subbotinae* are herein considered to be of early Eocene age. This zonation becomes a problem only in the outcropping Tuscahoma Formation, which, as an earlier discussion pointed out, contains *G. pseudomenardii* in its lower part and *G. subbotinae* in its upper part. Calcareous nannoplankton from marl beds in the Tuscahoma show that these beds are of Paleocene age (Gibson and others, 1982), and sporomorphs from the uppermost Tuscahoma indicate that the entire formation is probably late Paleocene (Frederiksen and others, 1982).

Downdip, all of the Paleocene and lower Eocene formations that are lithologically different in the outcrop area of Alabama grade by facies change into thick marine clay sequences separated by thin sands. The lithology and electric log patterns of these clays are uniform and the strata can be differentiated only on the basis of the microfauna that they contain. Accordingly, the Paleocene in this study was mapped in southern Alabama and western panhandle Florida on the basis of the highest occurrence of *G. velascoensis*. Rocks containing *G. subbotinae* were mapped as part of the early Eocene. As plate 2 shows, rocks of the Tuscahoma Formation or its equivalents are judged to represent the top of the Paleocene. The Hatchetigbee Formation and its equivalents are considered to represent the base of the early Eocene. Plate 2 also shows that neither the units mapped for this study nor the Paleocene-Eocene boundary as determined by Berggren (1971) and Oliver and Mancini (1980) coincides with the traditional concept of the Midwayan and Sabinian provincial stages.

Cedar Keys Formation

Cole (1944c, p. 28) used the name Cedar Keys Formation for "cream to tan colored, hard limestones which contain *Borelis gunteri* Cole and *Borelis floridanus* Cole in their upper portion." Cole thought that the Cedar Keys was an early Eocene unit and equivalent to the "Midway Formation," which at the time was also considered to be early Eocene. Both the Cedar Keys and the "Midway" are now considered to be Paleocene in age. Cole did not specify a type well section for the Cedar Keys. Applin and Applin (1944) called these rocks the "Cedar Keys Limestone" rather than "Formation," but they, like Cole, neglected to specify a type well. Winston (1976) subsequently designated a well in Levy County, Fla. (Coastal Petroleum Company's #1 Ragland, well FLA-LV-4) as the cotype well for the Cedar Keys and redefined the unit on the basis of lithologic criteria rather than paleontologic criteria. Samples examined by this author confirm the findings of Applin and Applin (1944), Chen (1965), and Winston (1976), all of whom observed that the Cedar Keys is practically everywhere either partially or completely dolomitized and that the unit in most places carries intergranular gypsum that fills much of the pore space in the dolomite. Accordingly, the unit should more properly be designated the "Cedar Keys Formation," the terminology used in this report. The upper part of the Cedar Keys usually consists of gray to cream, coarsely crystalline dolomite that is moderately to highly porous. The species of *Borelis* that characterize much of the Cedar Keys section are not present in this uppermost dolomite, because the dolomitization process obliterated any fauna enclosed in the original limestone.

Approximately the lower two-thirds of the Cedar Keys consists of tan to gray, finely crystalline to microcrystalline dolomite interbedded with white to clear anhydrite that commonly shows an interlithic or "chicken wire" texture—that is, thin, veinlike, contorted partings of dolomite separate large nodular masses of anhydrite. This texture, plus the extensive amounts of anhydrite present in the Cedar Keys, shows that the unit was deposited in a tidal flat type of environment, possibly analagous to but more areally extensive than, a modern sabkha environment. Locally, dolomite strata that are interbedded with the anhydrite contain abundant *Borelis spp.* and the foraminifer *Valvulammina nassauensis* Applin and Jordan, an indication that open marine conditions were reestablished periodically in the tidal flat areas.

The evaporite-dolomite sequence is characteristic of the Cedar Keys of the Florida peninsula (see pl. 3). A sharp demarcation exists between this facies and the clastic Paleocene beds that are part of the Clayton Formation in southern Georgia and its equivalents in panhandle Florida. The Cedar Keys may either interfinger with or grade into these clastic strata. Well data show that the clastic rocks become calcareous near the point where the clastic-carbonate facies change takes place. No well data available to this author show the Cedar Keys in contact with the clastic Paleocene beds, however. The faunal transition between the Cedar Keys and the clastic Paleocene is equally sharp. The *Borelis* fauna characteristic of the Cedar Keys has not been found as of this writing in any well that contains a planktic foraminiferal fauna of definite Paleocene age. Because of this limitation, no definitive age can be assigned to the Cedar Keys, and the unit is placed in the Paleocene in this study solely on the basis of its stratigraphic position. The thin beds of limestone that occur locally at the top of the clastic Paleocene section in the Florida panhandle do not resemble the Cedar Keys in any way.

The thick anhydrite beds of the Cedar Keys, where they are present, form the lower confining unit of the Floridan aquifer system. Locally, in the Brunswick, Ga., area, well data show that the Cedar Keys is permeable throughout (rather than only in the uppermost dolomite beds), and the entire formation is considered to be part of the Floridan aquifer system there.

Clayton Formation and equivalent rocks

The Clayton Formation, at its type area in eastern Alabama, consists mostly of coarse-grained sand and minor amounts of sandy, hard to semi-indurated, mollusk-rich limestone. Downdip for a short distance and eastward into extreme western Georgia, the amount of limestone in the Clayton increases. Still farther downdip, the limestone grades by facies change into a massive calcareous marine clay section that contains a few thin beds of sand. The Clayton thins westward and grades gradually into the sandy, silty Pine Barren Member below and the soft, marly McBryde Limestone Member above (pl. 2). In central and western Alabama, the upper part of the Clayton grades into the massive, dark-colored clay of the Porters Creek Formation (Toulmin, 1977). The Porters Creek is for the most part nonmarine to very shallow marine and is not the same as the marine clay that replaces the Clayton downdip. Scattered well data in central Alabama show that the Porters Creek, like the Clayton, grades laterally downdip into this massive marine clay, but a section of thick-bedded, marine, slightly glauconitic sand and gray to brown subfissile clay intervenes between the two formations. Locally, the uppermost beds of the Porters Creek consist of the thin, abundantly fossiliferous Matthews Landing Marl Member.

Most of the Paleocene strata in Georgia have been placed in the Clayton Formation by Herrick and Vorhis (1963). For the most part, the Clayton in Georgia consists of fine- to medium-grained glauconitic sand and clayey sand and smaller amounts of medium- to dark-gray clay. The top of the Clayton in Georgia is commonly marked by a dark-gray, sandy, glauconitic, hard limestone that usually contains casts and molds of pelecypods and gastropods. This limestone is thickest in western Georgia, where it constitutes an important local source of ground water. In eastern Georgia, near the Savannah River, the amount of dark-colored clay in the Clayton increases and grades laterally into the Black Mingo Formation of South Carolina, which consists mostly of dark-colored, carbonaceous clay and thin beds of fine- to medium-grained sand.

In southeastern Georgia, clastic beds of the Clayton merge along a fairly sharp line (pl. 3) with light-colored dolomite of the Cedar Keys Formation. Locally, in updip areas of the central Georgia Coastal Plain, the Clayton grades into dark-colored clay that has been called the Porters Creek Formation, which in turn grades into sands that may be part of the Huber Formation (Huddlestun, 1981).

Undifferentiated Paleocene rocks

Paleocene rocks in most of panhandle Florida, much of southern Alabama, and a small area in extreme southwestern Georgia consist of massive, gray to greenish-gray, subfissile, calcareous, occasionally sandy and slightly glauconitic marine clay. Eastward, this clay grades into argillaceous limestone, which in turn grades into dolomite and dolomitic limestone of the Cedar Keys Formation. Northward, the clay grades into the sand, clay, and limestone sequence of the Clayton Formation. The massive clay is at present unnamed. Applin and Applin (1944) referred to this unit informally as "the clastic lithofacies of the Paleocene" or as the "Tamesii faunal unit" because these clay beds contain a foraminiferal fauna in their lower part that is similar to the fauna of the lower Paleocene Tamesii (Velasco) Formation of Mexico.

Applin (1964) thought the "Tamesii fauna" represented a span of time roughly equivalent to that during which the Clayton, Porters Creek, and Naheola Formations were deposited. The implication is that the massive clay cannot be differentiated into these three units, as Chen (1965) correctly stated. Chen chose to call the massive clay unit the "Midway Formation." The author prefers the term "undifferentiated Paleocene rocks" because it avoids the implication that the term Midway is synonymous with rocks of Paleocene age.

Microfossils diagnostic of undifferentiated Paleocene strata in the study area include the planktic Foraminifera *Globorotalia pseudomenardii* Bolli, *G. velascoensis* (Cushman), *G. angulata* (White), and *G. pseudobulloides* (Plummer). In shallower water deposits, the Ostracoda *Cythereis reticulodacyi Swain*, *Krithe perattica* Alexander, and *Trachylebris prestwichiana* (Jones and Sherborn) are characteristic.

Nanafalia Formation

The outcropping Nanafalia Formation in western Alabama can be divided into (1) the lower Gravel Creek Sand Member, a coarse-grained sand, (2) a middle, highly fossiliferous glauconitic sand unit informally called the "*Ostrea thirsae*" beds, and (3) the upper Grampian Hills Member, which consists of dark greenish-gray clay interbedded with minor amounts of glauconitic sand (pl. 2). The Gravel Creek Sand is poorly preserved as local erosional remnants in eastern Alabama. The diagnostic Nanafalia oyster *Odontogryphea thirsae* Gabb, characteristic of the middle part of the Nanafalia, ranges upward into the basal beds of the Grampian Hills Member. The upper and middle parts of the Nanafalia in eastern Alabama and western Georgia grade laterally updip into the Baker Hill Formation (Gibson, 1982a), a sequence of interbedded micaceous sand and kaolinitic, bauxitic, and carbonaceous clay. Nanafalia sediments rapidly become finer grained and more marine in a gulfward direction. In southernmost Alabama and western panhandle Florida, beds that are the equivalent of the Nanafalia are gray to greenish-gray marine clays that are indistinguishable from the underlying clays belonging to undifferentiated Paleocene rocks. The Nanafalia clays can be separated from these older clays only in wells where beds of either limestone or calcareous sand occur between the two thick clay units. The outcropping Nanafalia is known to thin as it loses coarser clastics in a downdip direction (Toulmin, 1977; Reinhardt and Gibson, 1980), and subsurface data still farther downdip show that the Nanafalia (upper) part of the massive marine clay sequence is thin in comparison with the lower part.

Tuscahoma Formation

The Tuscahoma Formation in outcrop and in the shallow subsurface is chiefly silt and silty clay containing some fine-grained sand beds. Locally, sand is the dominant lithology in outcrop areas. Some sand beds are glauconitic and fossiliferous, and two such beds have been named the Greggs Landing and Bells Landing Marl Members. The Tuscahoma grades downdip into soft, brown to gray, calcareous, slightly glauconitic clay that contains much fine-grained organic material and a few beds of fine-grained glauconitic calcareous sand.

Still farther southward, the Tuscahoma grades into gray to greenish-gray marine clays that are included in the undifferentiated Paleocene rocks. *Globorotalia pseudomenardii* Bolli and *G. velascoensis* (Cushman) characterize the Tuscahoma. *G. subbotinae* Morozova, which is found in the outcropping Tuscahoma, is not considered characteristic of the formation in the subsurface.

Local Paleocene units

There are several Paleocene units of local to subregional extent in and contiguous to the study area. One of these is the Ellenton Formation in South Carolina (pl. 2), a thin unit of clay and marl (Siple, 1967) whose extent is poorly known and which is dated in only a few places. Although the Ellenton is possibly equivalent to basal Paleocene deposits in the Charleston, S.C., area (G. S. Gohn, written commun., 1983) that were called Beaufort(?) Formation by Gohn and others (1977), well control is not sufficient to correlate the two units exactly. Faye and Prowell (1982) assigned an early to middle Paleocene age to cored materials in Burke County, Ga., that they thought belonged to the Ellenton Formation. Another such local unit is the Naheola Formation in Alabama, which consists of the lower Oak Hill Member (a laminated dark-colored silt, clay, and sand sequence that is locally fossiliferous) and the upper Coal Bluff Marl Member (a fossiliferous glauconitic sand). The Naheola is not recognized in the subsurface, but its equivalents are possibly part of the massive, unnamed, downdip marine clay of Paleocene age. A third Paleocene unit of minor importance is the Salt Mountain Limestone, a white, massive, dense, microcrystalline to finely crystalline limestone that crops out locally in western Alabama, where it has been upthrown along the Jackson fault zone (Toulmin, 1940; Wind, 1974). The Salt Mountain is thin and discontinuous in the subsurface and occurs as a series of disconnected lenses that typically lie within the upper third of the thick, undifferentiated Paleocene clay sequence.

Depositional Environments

Rocks of Paleocene age were for the most part deposited in marine or marginal marine environments. In updip areas, the basal sands of the Clayton Formation represent a transgressive marine sand. Their western equivalents, the laminated, fossiliferous silt and sand of the Pine Barren Member of the Clayton, represent a shallow, restricted marine environment such as a bay or an estuary. Both the Pine Barren and the basal Clayton sands were succeeded by soft, micritic (McBryde Limestone Member) to shelly, sandy limestone that represents a shallow, open marine environment. A minor regression of the sea followed deposition of this limestone, during which a shallow marine sand (part of the Clayton) was laid down in eastern Alabama and the blocky, massive, nonmarine to very shallow marine Porters Creek Formation was deposited in western Alabama. The Matthews Landing Marl Member of the Porters Creek was deposited in a restricted marine environment during a minor transgression near the end of Porters Creek time. In middip areas, the Clayton Formation and its equivalents are entirely shallow marine. The laminated silty sands of the Tuscahoma Formation were deposited in a restricted marine environment, probably a tidal flat. Periodically, local transgressions of the sea covered the tidal flat and allowed deposition of the Greggs Landing and Bells Landing Marl Members. Farther downdip, the massive marine clay that is the deeper water equivalent of the Clayton, the Nanafalia, and the Tuscahoma was deposited in quiet open-marine water in a midshelf area.

To the south and east of the clastic Paleocene rocks, the Cedar Keys Formation was deposited in a shallow, warm-water, carbonate bank environment. The extensive evaporite deposits of the Cedar Keys represent tidal flat or sabkha-type conditions that existed over wide areas and for a long time on this carbonate bank.

The basal part of the Naheola Formation in western Alabama (Oak Hill Member) represents a fluvial to very shallow marine (tidal flat accompanied by occasional oyster banks) environment. The succeeding Coal Bluff Marl Member of the Naheola was deposited in a restricted marine to very shallow open marine environment. Downdip, the Naheola probably passes by facies change into part of the massive, open marine clay that forms most of the downdip Paleocene. Well control is not available to show such a transition, however.

The Salt Mountain Limestone was deposited in an open marine, quiet, shallow-water environment. The Salt Mountain is thin and discontinuous, possibly as the result of postdepositional erosion. In wells where the Salt Mountain is absent and the Paleocene sequence consists entirely of marine clay, however, no disconformity is known to exist within the massive clay sequence.

The Gravel Creek Member of the updip Nanafalia Formation in western Alabama is a fluvial sand. It is overlain by the *"Ostrea thirsae"* beds and the Grampian Hills Member, both of which were deposited in a restricted marine environment. The Baker Hill Formation, which is the equivalent of the upper Nanafalia in eastern Alabama and western Georgia, was deposited in fluvial and estuarine environments. Downdip, the Nanafalia Formation grades into and becomes part of the massive, marine, undifferentiated Paleocene clay.

The Ellenton Formation is thought to represent a basal shallow marine transgressive deposit that consists in large part of reworked sediments from the underlying Cretaceous. The Beaufort(?) Formation of Gohn and others (1977) consists mostly of marginal marine beds. The overlying Black Mingo Formation is shallow marine for the most part and reflects a slight regression followed by a transgression.

EOCENE SERIES

General

The thick sequence of Eocene rocks that is everywhere present in the study area can be readily divided into rocks of early, middle, and late Eocene age. The rocks mapped during this study as middle Eocene and late Eocene correspond to the Claibornian and Jacksonian provincial Gulf Coast stages, respectively. Rocks of early Eocene age as mapped correspond to the upper part of the Sabinian provincial stage. These relationships are shown on the generalized correlation chart (pl. 2). As the section of this report dealing with the Paleocene Series discusses, the traditionally accepted concept that the Sabinian Stage is equivalent to the Wilcox Group and that both terms refer to rocks of early Eocene age is no longer valid. Many of the units formerly assigned to the lower part of the Sabinian Stage are now known to be of Paleocene age, rather than Eocene (Oliver and Mancini, 1980; Gibson, 1980, 1982a). These units are accordingly included in the Paleocene Series as mapped in this report.

Eocene strata in the study area are extensive, thick, and, where they consist of carbonate rocks, generally highly permeable. The major part of the Floridan aquifer system is made up of Eocene rocks, which commonly show highly developed primary (intergranular) and secondary (dissolution) porosity, particularly in their upper parts. Like the Paleocene rocks, carbonate rocks of both early and middle Eocene age grade updip by facies change into calcareous, glauconitic, clastic rocks. This carbonate-clastic transition lies farther to the north and west in lower Eocene strata than it does in the underlying Paleocene and is located still farther north and west in middle Eocene rocks. Upper Eocene rocks retain their carbonate character in many places up to the point where they are truncated by erosion. The overall effect is that of a general regional transgression that began in Paleocene time and persisted through the late Eocene and during which the marine facies of progressively younger rocks extended progressively farther and farther inland. Several minor regressions punctuated this general transgression. These observations are consistent with the sea level curve of Vail and others (1977), which shows that sea level worldwide became progressively higher from early to late Eocene time.

Rocks of early Eocene age

Downdip, a lower Eocene carbonate sequence underlies southeastern Georgia and the Florida peninsula; updip, the remainder of the study area is underlain by clastic lower Eocene rocks. Locally, in South Carolina, the Eocene in the subsurface is an impure limestone. Plate 4 shows the configuration of the top of rocks of early Eocene age and the area where they crop out. Comparison of plate 4 with a map of the structural surface of the Paleocene (pl. 3) shows that, in Alabama and southwestern Georgia, lower Eocene rocks lie to the south and east of Paleocene rocks in offlap relationship. In central Georgia, however, beds of early Eocene age overlap and extend farther to the north than the underlying Paleocene rocks. Lower Eocene rocks are known to extend farther to the north in this overlap area than plate 4 shows, but they have been mapped during this study only to the limits of the well control used to delineate the Floridan aquifer system. In the western part of the study area, the configuration of the top of the early Eocene is contoured up to the limit of outcrop of these rocks (pl. 4).

Many of the large- to intermediate-scale structural features that affect the shape of the Paleocene surface (pl. 3) are recognizable on the early Eocene surface (pl. 4). Those features common to both maps include (1) the Peninsular arch in north-central Florida, (2) the Southeast Georgia embayment, and (3) a steep, steady slope toward the Gulf Coast geosyncline in the western part of the study area. The Southwest Georgia embayment in eastern panhandle Florida is a negative area on both the Paleocene and early Eocene tops, but this feature is deeper and narrower and extends farther to the northeast on the early Eocene surface than it does on the top of the Paleocene. The configuration of th South Florida basin in southwestern peninsul Florida likewise differs on the Paleocene and earl Eocene surfaces. This feature was somewhat silled c its gulfward side in Paleocene time (pl. 3) but, at th end of early Eocene time (pl. 4) it was open to the gu and appears to have been partially filled from the ea and northeast. The Suwannee strait, a closed low th appears in southeastern Georgia on the map of th Paleocene surface, was apparently filled with sed ments during early Eocene time and thus does n exist on the map of the early Eocene surface.

The maximum measured depth to the top of low Eocene rocks is about 3,900 ft below sea level in we ALA-BAL-30 in the southern part of Baldwin Count Ala. The maximum contoured depth is below 4,200 f in the same general area. Lower Eocene rocks a slightly less than 800 ft below sea level on the crest the Peninsular arch, from which they deepen in a directions. In the Southwest Georgia embayment an the South Florida basin, the top of lower Eocene rock is below 2,600 ft.

The thickness of lower Eocene strata is shown o plate 5, along with the distribution of the clastic an carbonate facies within this unit. The clasti carbonate boundary and much of the contourin shown on this plate are derived from well control. I areas of sparse control, the thickness of the earl Eocene has been estimated as the difference betwee contoured altitudes of the top of the early Eocer (plate 4) and the top of the Paleocene (plate 3). In sout Florida, lower Eocene rocks are more than 1,500 thick; in parts of panhandle Florida, they are mor than 1,100 ft thick. On the crest of the Peninsul arch, these strata are less than 300 ft thick, and the thin to a featheredge in areas of outcrop.

Oldsmar Formation—Except for the Fishburne Fo mation that occurs locally in South Carolina, all th lower Eocene carbonate rocks in the study area ar part of the unit that Applin and Applin (1944) name the Oldsmar Limestone. The Oldsmar, however, con tains much dolomite, and thin beds of chert and eva porite deposits occur in the unit from place to plac The Oldsmar is therefore referred to as a "formation rather than a "limestone."

The Oldsmar Formation consists mostly of off-whit to light-gray micritic to finely pelletal limestone thic ly to thinly interbedded with gray to tan to ligh brown, fine to medium crystalline, commonly vugg dolomite. The lower part of the formation is usuall more extensively dolomitized than the upper par Pore-filling gypsum and thin beds of anhydrite occur i the lowermost parts of the Oldsmar in places, partic larly in a crescent-shaped band extending from Dix County, Fla., northeast to southern Ware County, G

The location of this band, which locally comprises the base of the Floridan aquifer system, is shown on plate 33. In scattered places, the Oldsmar contains trace amounts of glauconite.

Applin and Applin (1944, p. 1699) defined the Oldsmar "to include the interval that is marked at the top by the presence of abundant specimens of *Helicostegina gyralis* Barker and Grimsdale...and that rests on the Cedar Keys limestone." This definition is unsatisfactory because (1) it is based on the microfaunal content of the strata, not on their lithologic characteristics, and (2) it is based on a species whose range is not restricted to the early Eocene. The author has found specimens of *H. gyralis* that show no evidence of reworking 50 to 70 ft above the top of the Oldsmar in rocks that are part of the overlying middle Eocene sequence ("Lake City" Limestone). Cole and Gravell (1952) reported this species from middle Eocene beds in Cuba. The Oldsmar Formation is thus redefined herein as the sequence of white to gray limestone and interbedded tan to light-brown dolomite that lies between the pelletal, predominantly brown limestone and brown dolomite of the middle Eocene and the gray, coarsely crystalline dolomite of the Cedar Keys Formation. *H. gyralis* is commonly found as part of a characteristic Oldsmar fauna that includes several other species of larger foraminifers listed in table 1. None of these species, however, is ubiquitous within the Oldsmar Formation, nor should they be the criterion by which the Oldsmar is defined.

The Oldsmar Formation underlies all of the Florida peninsula and the southeastern corner of Georgia (pl. 5). Westward, in the eastern part of the Florida panhandle, the Oldsmar becomes increasingly argillaceous and interfingers with calcareous clastic rocks. To the north, in south-central Georgia, the Oldsmar grades from limestone through argillaceous limestone and calcareous clay into glauconitic calcareous sand.

In addition to *H. gyralis*, the larger Foraminifera *Miscellanea nassauensis* Applin and Jordan, *Pseudophragmina (Proporocyclina) cedarkeysensis* Cole, and *Lockhartia sp.* are considered characteristic of the Oldsmar Formation.

Undifferentiated lower Eocene rocks—Lower Eocene rocks in the western part of the Florida panhandle consist of brownish- to greenish-gray, calcareous, slightly glauconitic shale and siltstone that are occasionally micaceous. Thin beds of fine-grained, slightly glauconitic sandstone and off-white sandy glauconitic limestone occur sporadically throughout the predominantly argillaceous section. These rocks are part of the unit that was called the "clastic facies of Wilcox age" by Applin and Applin (1944) and the "Wilcox Formation" by Chen (1965). Both Chen and the Applins included beds that are the downdip equivalents of the Nanafalia Formation, the Tuscahoma Formation, and the Salt Mountain Limestone in their "Wilcox" unit. In this report, the Nanafalia, Tuscahoma, and Salt Mountain are considered to be of Paleocene age and to grade downdip into undifferentiated argillaceous rocks of Paleocene age. The term "undifferentiated early Eocene rocks" is herein applied to the massive, predominantly argillaceous early Eocene section of western panhandle Florida. These strata grade eastward into the Oldsmar Formation and become less marine and slightly coarser grained updip in southern Alabama and southwestern Georgia, where they take on the character of the outcropping Hatchetigbee Formation.

Microfauna considered characteristic of undifferentiated rocks of early Eocene age include the Foraminifera *Globorotalia formosa gracilis* Bolli and *Rotalia trochoidiformis* (Lamarck). The Foraminifera *Globorotalia subbotinae* Morozova and *G. wilcoxensis* (Cushman and Ponton) are also considered characteristic of early Eocene rocks in the study area, even though these species are known to range downward into rocks of late Paleocene age elsewhere (Stainforth and others, 1975). The Ostracoda *Brackhcythere jessupensis* Howe and Garrett and *Haplocytheridea sabinensis* (Howe and Garrett) are also considered characteristic of these beds.

Bashi and Hatchetigbee Formations—The lithology of the Hatchetigbee Formation in the area where it crops out in western Alabama is very similar to that of the underlying Tuscahoma. In practice, the two are difficult to separate except where the sandy, glauconitic, highly fossiliferous Bashi Formation (Gibson, 1982b) lies between them. The Bashi occurs only as erosional remnants in eastern Alabama and western Georgia. Downdip, the Hatchetigbee consists of interbedded fine sand and gray calcareous clay. The sand is lost in a short distance gulfward, and the argillaceous Hatchetigbee beds merge in middip areas with the underlying clay of the Tuscahoma.

Unnamed mid-Georgia lower Eocene rocks—In the west-central part of the Georgia coastal plain, lower Eocene rocks consist of medium-grained, calcareous, often dolomitic, glauconitic sandstone interbedded with soft, light-gray, calcareous, glauconitic clay. The sandstone ranges from unconsolidated to well indurated, depending on the amount of calcareous matrix that binds the sand grains. Although these strata are the probable equivalents of the combined Hatchetigbee Formation of eastern Alabama and southwestern Georgia, they are unnamed at present and are not shown on the correlation chart (pl. 2) because their relation to the Hatchibtigbee is still inexactly known.

These unnamed lower Eocene sand and clay beds become progressively more argillaceous and calcareous downdip to the southeast and grade into an off-white, micritic, glauconitic, argillaceous limestone that commonly contains the foraminifer *Pseudophragmina (Proporocyclina) cedarkeysensis* Cole, a species that is found in the Oldsmar Formation in Florida. This micritic limestone, unnamed at the time of this writing, grades seaward over a short distance into a typical Oldsmar lithology. Updip, the lower Eocene clay beds are lost, and the sands become progressively less marine until they grade into a predominantly fluvial thick sand sequence that may be part of the Huber Formation (Huddlestun, 1981).

In easternmost Georgia, lower Eocene rocks consist mostly of calcareous, glauconitic, argillaceous sand, cream to gray calcareous clay, and sandy, glauconitic limestone. Locally, some of the clayey beds are dark brown and silty and contain much fine-grained organic material. Northeastward, in South Carolina, lower Eocene strata consist of sandy, fossiliferous, glauconitic limestone that has recently been named the Fishburne Formation (Gohn and others, 1983).

DEPOSITIONAL ENVIRONMENTS—Most of the lower Eocene rocks in the study area were deposited in shallow open marine to marginal marine environments. The laminated silty sands of the Hatchetigbee Formation were deposited in a restricted marine area, probably on tidal flats. Periodically, slightly deeper marine waters covered the tidal flats, and the Bashi Formation was deposited during such a local short-lived transgression.

Seaward of this marginal marine area, the undifferentiated thick sequence of fine clastic rocks of early Eocene age was deposited in quiet, shallow to moderately deep, open marine waters in the area that is now western panhandle Florida. Open marine conditions characterized by slightly higher energy levels existed in the central part of the Georgia coastal plain during early Eocene time, and an interbedded sequence of marine sand and clays was deposited there. This sequence, unnamed at present, grades laterally to the northeast into shallow marine sandy limestone that represents the Fishburne Formation of South Carolina.

Both the shallow water, open marine, clastic lower Eocene strata of central Georgia and the deeper water, massive clay sequence of panhandle Florida grade into and interfinger with the Oldsmar Formation. The Oldsmar was deposited in warm, shallow, open marine water and represents a carbonate bank environment. The minor evaporites found occasionally in the lower part of the Oldsmar represent sabkha conditions that were short lived and not areally extensive.

ROCKS OF MIDDLE EOCENE AGE

Middle Eocene strata are present over almost al the study area and can generally be divided int downdip platform carbonate facies and an updip fac that is predominantly clastic. The carbonate facies the middle Eocene extends much farther to the no and west than the carbonate rocks of the underly early Eocene. Approximately half of the Geor coastal plain, much of the eastern part of the Flor panhandle, and all of the Florida peninsula are unc lain by middle Eocene carbonate rocks. In the rema der of the study area, the middle Eocene consists marine to marginal marine clastic rocks.

The configuration of the top of the middle Eoc and the area where this unit crops out are shown plate 6. Middle Eocene rocks in Alabama and sou western Georgia are located farther gulfward th underlying rocks of early Eocene age. In contrast this offlap relation, the lower Eocene is overlapped middle Eocene strata in central Georgia and in Sou Carolina. The top of the middle Eocene is contourec the point where the unit pinches out in its outcrop a but only to the limit of well control in eastern Geor and South Carolina. In these areas, the middle Eoc is mostly overlapped by younger rocks.

The effect of several large-scale structural featu is reflected on the middle Eocene surface. Althou many of these features are recognizable on maps of tops of older units (pls. 3, 4), their locations and sha are different on the middle Eocene map (pl. 6). T Peninsular arch is poorly defined on plate 6, and surface is highly irregular, probably as a result erosion and dissolution of the top of the middle Eoce The top of middle Eocene strata in this area is gene ly higher than 200 ft below sea level. The Southe and Southwest Georgia embayments and the Sou Florida basin are present as low areas on the mid Eocene top, but they are not as pronounced as they a on the maps of older units. These basins were probal relatively quiescent and were being filled during m dle Eocene time. The Gulf Coast geosyncline v actively subsiding during the middle Eocene, as steep, steady gulfward slope of the top of the unit western panhandle Florida shows. The configurati of the unnamed negative area in east-central Geor and of the high area parallel to it in southeastern Sou Carolina are similar on the middle Eocene top to th on older units.

Several faults of small to intermediate throw fi occurred during middle Eocene time (pl. 6). Unlike large-displacement faults in southwestern Alaba that affect the entire column of rocks mapped for t study, most of the faults shown on plate 6 in cent

Georgia and peninsular Florida appear to die out downward within the middle Eocene. An exception is the fault in Palm Beach County, Fla., which cuts rocks at least as old as Paleocene (pl. 3). The series of northeast-trending faults in south-central Georgia bounds several small grabens and half grabens that are collectively called the Gulf Trough (Herrick and Vorhis, 1963). Like most of the faults in peninsular Florida, the Gulf Trough faults appear to die out at shallow depths. A seismic profile was obtained across one of the major Gulf Trough faults in northeastern Colquitt County, Ga., as part of this study. The record on this profile is poor down to a depth of approximately 1,200 ft below land surface. Deeper than about 1,300 ft (roughly the middle of rocks of middle Eocene age), however, sharp reflectors can easily be traced on the profile and do not show the graben structure that well data prove to exist at shallower depths.

The maximum measured depth to the top of the middle Eocene is 3,490 ft below sea level in well ALA-BAL-30 in southwestern Baldwin County, Ala. The maximum contoured depth is below 3,700 ft in the same area (pl. 6). The top of the middle Eocene slopes in all directions from the crest of the Peninsular arch and reaches depths of more than 1,800 ft in the Southwest Georgia embayment, more than 1,600 ft in the South Florida basin, and more than 1,000 ft in the Southeast Georgia embayment. Middle Eocene rocks are slightly above sea level at scattered places on the Peninsular arch. They are exposed at the surface in Citrus and Levy Counties, Fla., where they represent the oldest outcropping rocks in the state.

The thickness of middle Eocene rocks is shown on plate 7, which also shows the limits of the unit's clastic and carbonate facies. The position of the interface between these facies is approximate because it is based on well control. The thickness trends shown on plate 7 have been extended in areas where well control is scattered by subtracting the contoured tops of rocks of early and middle Eocene age. From a featheredge in outcrop areas, the middle Eocene thickens seaward to more than 1,200 ft in the Southwest Georgia embayment and to more than 1,000 ft in southeastern Georgia. Along panhandle Florida's Gulf Coast, these strata are more than 900 ft thick. They thin to less than 500 ft over the crest of the Peninsular arch and thicken southward to more than 1,600 ft in east-central peninsular Florida. Although the middle Eocene is between 1,000 and 1,400 ft thick in most of southern Florida, the unit thins to less than 900 ft in part of the South Florida basin, and shows that this basin was not subsiding rapidly during middle Eocene time.

Avon Park Formation—Applin and Applin (1944, p. 1686) applied the name Avon Park Limestone to the upper part of the late middle Eocene section in a well at the Avon Park Bombing Range in the southernmost part of Polk County, Fla. They referred to the Avon Park as "a distinct faunal unit" and described it as "mainly cream-colored, highly microfossiliferous, chalky limestone" that locally contains some gypsum and chert and that is commonly partially dolomitized. Well cuttings examined during this study show that the Avon Park is in many places composed almost entirely of dolomite. The Avon Park is thus referred to in this report as a "formation" rather than a "limestone."

The term Lake City Limestone was introduced by Applin and Applin (1944, p. 1693) for the lower part of rocks of middle Eocene age in a well at Lake City in Columbia County, Fla. The Lake City was described as "alternating layers of dark brown and chalky limestone"; gypsum and chert are present in some wells. Regionally, the lower part of the middle Eocene, like the upper part, contains much dolomite.

In the early 1940's, there were few deep wells in Florida, and the samples from many of these wells were either contaminated or incomplete. Electric logging was a new technique at the time, and those few logs that were in existence were largely unreliable. A common practice in subsurface stratigraphy was to use paleontologic and lithologic units interchangeably. All of these factors led to imprecise definitions for most of the limestone units of Florida. Between some adjacent "formations," lithologic change is subtle; in places, there is no change at all. Stratigraphic breaks in much of the Florida section currently are based upon a change in the benthic microfauna that the rocks contain. Where dolomitization has obliterated the microfauna, or where it is lacking in nondolomitized sections, correlations are inconsistent. Although most workers studying the Florida subsurface recognize the problem, almost all Tertiary limestone correlations are still made on the basis of the microfaunal assemblages that Applin and Applin (1944) and Applin and Jordan (1945) thought were diagnostic. This practice is, of course, not in accordance with the rules of the current North American Stratigraphic Code (North American Commission on Stratigraphic Nomenclature, 1983). Units that are in reality biostratigraphic units have been mapped as if they were rock-stratigraphic units. Fortunately, as Winston (1976), recognized, the paleontologically defined units of Applin and Applin (1944) in many cases coincide with lithologic units. Exceptions to this generalization are the Avon Park and Lake City Limestones.

There are no lithologic criteria that can be used to separate the middle Eocene carbonate rocks in Florida and in southern Georgia. Both the so-called Avon Park and Lake City Limestones consist primarily of cream, tan, or light-brown, soft to well-indurated limestone that is mostly pelletal but is locally micritic. The pellets consist of fine to coarse sand-sized particles of micritic to fine crystalline limestone and small- to medium-sized Foraminifera; they are bound by a micritic to finely crystalline limestone matrix. The limestone is thinly to thickly interbedded with cream or light- to dark-brown, fine to medium crystalline, slightly vuggy dolomite, fractured in some places, whose texture is locally sucrosic to argillaceous. Locally, differences exist between the general lithologic character of the lower part of the middle Eocene and that of its upper part. Unfortunately, two of the limited number of wells available to the Applins (the Avon Park Bombing Range and Lake City wells) showed such contrasts, and it was on the basis of the limited data then available that the Avon Park and Lake City were named and extended regionally. More recent drilling shows conclusively that the rock types that the Applins thought were representative of their "Lake City" are found in many places at the top of the middle Eocene (in their "Avon Park" part) and the reverse is also true.

Paleontologic criteria by which the Avon Park and Lake City can be differentiated are lacking. In the original definition of both the Avon Park and the Lake City, certain faunal zones by which these units could be recognized were listed. The Lake City was thought to extend from the highest occurrence of *Dictyoconus americanus* (Cushman), accompanied by *Fabularia vaughani* Cole and Porter, down to the highest occurrence of *Helicostegina gyralis* Barker and Grimsdale, thought to characterize the Oldsmar. None of these species is restricted to the horizon for which it is supposed to be characteristic. *H. gyralis* commonly occurs several hundred feet above a typical Oldsmar lithology. In this study, *Fabularia vaughani* has been found at or just below the top of the middle Eocene—in the "Avon Park" part. *Dictyoconus americanus* has been reported by Cole (1944, 1945) and by Vernon (1951) from the upper part of the middle Eocene. The author has found several additional species that were listed as diagnostic Lake City Foraminifera by Applin and Jordan (1945) within 20 to 50 feet of the top of the uppermost middle Eocene. These species include *Discorbis inornatus* Cole, *Fabularia gunteri* Applin and Jordan, and *Gunteria floridana* Cushman and Ponton. Cole and Gravell (1952) found several supposedly diagnostic Lake City species in the same beds as supposedly diagnostic Avon Park species in the outcropping middle Eocene of Cuba. The Avon Park was originally defined by Applin and Applin (1944) as extending from the highest occurrence of *Coskinolina floridana* Cole downward to the top of *Dictyoconus americanus*. As Applin and Applin (1944, p. 1687), recognized, however, that *Coskinolina floridana* is abundant in Oligocene Suwannee Limestone in many places.

The so-called Avon Park and Lake City Limesto cannot be distinguished from each other on the basis either lithology or fauna, except locally. Therefore, it here proposed that the term "Lake City" be abandon and that all of the cream to brown pelletal limestc and interbedded brown to cream dolomite of mid Eocene age in peninsular Florida and southern Geor be placed in the Avon Park Formation. The te "Avon Park" is retained because (1) it has preceder over the term "Lake City," (although both the Av Park and the Lake City were named in the same rep by Applin and Applin (1944), the Avon Park w described on an earlier page in that paper) and (2) t term has traditionally been applied to rocks wh lithology is different from that of the overlying Oc Limestone. The Avon Park is more properly calle "formation" rather than a "limestone" because it c tains appreciable amounts of rock types other th limestone. The extended definition of the Avon P Formation proposed here refers to the sequence predominately brown limestones and dolomites of v ous textures that lies between the gray, largely mic ic limestones and gray dolomites of the Oldsmar F mation and the white foraminiferal coquina or fossi erous micrite of the Ocala Limestone.

The reference section proposed for the extend Avon Park Formation is the interval from 221 to 1,1 ft below land surface in the Coastal Petrole Company's No. 1 Ragland well in sec. 16, T. 15 S. R. E, in Levy County, Fla. Cuttings from this well are file at the Florida Bureau of Geology, Tallahassee, F as well W-1537 or permit number 66. The well numbered FLA-LV-4 in this report. A lithologic scription of the cuttings from the proposed type wel given in the Appendix of this report. The top of t Avon Park is not known in the type well because the is a gap in the cuttings from the basal Ocala at a dep of 110 ft to the uppermost Avon Park sample at 221 Figure 5 shows a representative electric log pattern f the Avon Park Formation (extended) in a nearby w in Levy County, Humble's No. 1 C. E. Robinson (w FLA-LV-5 of this report).

Fauna considered characteristic of the revised Av Park Formation include the Foraminifera *Spiroli coreyensis* (Cole), *Lituonella floridana* (Cole), *Discor inornatus* Cole, *Valvulina cushmani* Applin and J dan, *V. martii* Cushman and Bermudez, *Fabula vaughani* Cole and Ponton, *Textularia coreyensis* C *Gunteria floridana* Cushman and Ponton, *Pseud bitolina cubensis* Cushman and Bermudez, *Ampl tegina lopeztrigoni* Palmer, and *Lepidocyclina antil* Cushman (formerly called *L. gardnerae* Cole). Fr ments of the alga *Clypeina infundibuliformia* More and Morellet are also considered characteristic of the Avon Park.

To the north and west, the Avon Park Formation grades into an argillaceous, soft to semi-indurated, micritic, glauconitic limestone that in turn grades updip into calcareous, glauconitic, often shelly sand and clay beds that are parts of the Lisbon and Tallahatta Formations. The middle third of the revised Avon Park Formation in the eastern half of the Florida peninsula and in much of southeastern Georgia is micritic, low-permeability, finely pelletal limestone. Approximately the lower half of the extended Avon Park in west-central peninsular Florida consists of low-permeability dark-colored gypsiferous limestone and dolomite. Both the micritic limestone and the gypsiferous carbonate beds comprise important subregional confining units within the Floridan aquifer system.

Tallahatta Formation—Where the Tallahatta Formation crops out in western Alabama, it consists largely of greenish-gray, porous, fine-grained siliceous claystone (called buhrstone in older reports) and some interbedded sands that are calcareous and fossiliferous near the top of the unit. In eastern Alabama, the outcropping Tallahatta is mostly poorly sorted, occasionally gravelly sand interbedded with greenish-gray clay and calcareous sand near the top. In southwestern Georgia, the outcropping Tallahatta is somewhat more marine than it is in Alabama and consists of fine- to coarse-grained slightly fossiliferous sand interbedded with dark-brown, silty, micaceous, occasionally glauconitic limestone. Chert is common near the base of the Tallahatta in updip areas in Georgia.

Downdip, in both Alabama and Georgia, the Tallahatta consists largely of interbedded gray to greenish-gray glauconitic sand and greenish-gray to brownish-gray shale; light- to dark-brown glauconitic fossiliferous limestone is common. Farther seaward in Georgia, the Tallahatta grades into cream to light-gray glauconitic, argillaceous, somewhat sandy limestone that in turn grades into the revised Avon Park Formation. Along and just to the north of the Gulf Coast of Alabama and western panhandle Florida, the Tallahatta consists mostly of gray to greenish-gray clay and thin to moderately thick interbeds of fine-grained, glauconitic, calcareous sand. Neither the limestone facies nor the calcareous clay and sand of western Florida and southern Alabama can be distinguished from similar overlying strata that are considered to be the Lisbon Formation in this study. In northeastern Georgia, the Tallahatta is mostly gray, calcareous, fossiliferous clay and has a thin sequence of calcareous sand and glauconitic limestone at the base. These strata grade northeastward into calcareous shelly sand

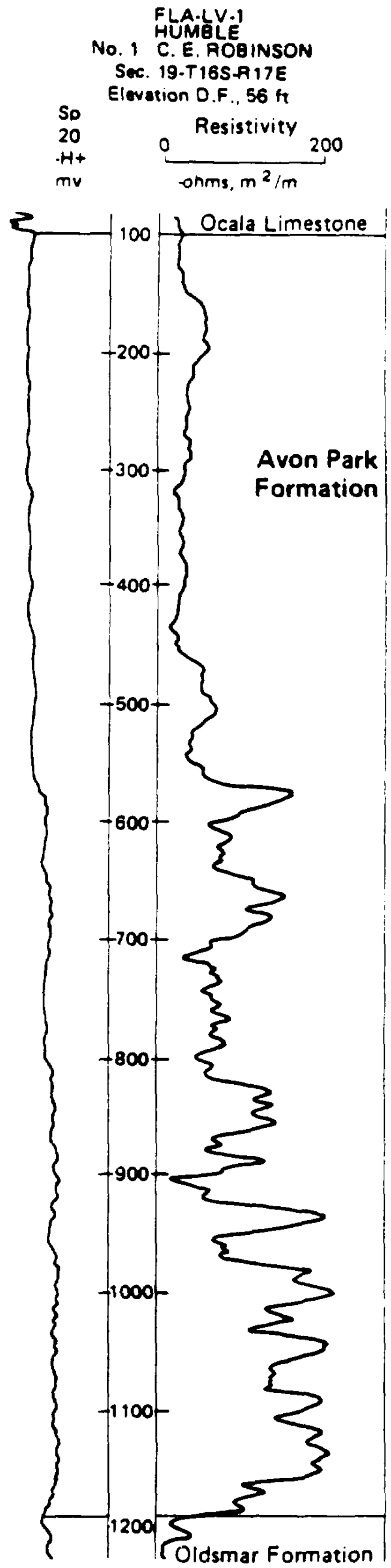


Figure 5. Representative electric log pattern for the Avon Park Formation.

and clay beds that are parts of the Congaree Formation and the Warley Hill Marl of South Carolina.

LISBON FORMATION—In its outcrop area in southwestern Alabama, the Lisbon Formation consists of interbedded calcareous, glauconitic sand, sandy clay, and clay, all of which are dark green to greenish gray and fossiliferous. Carbonaceous clays commonly occur near the middle of the Lisbon in this area. In central Alabama, the outcropping Lisbon is mostly sand. Farther eastward, in southeastern Alabama and southwestern Georgia, the composition and appearance of Lisbon in outcrop are similar to those of the Lisbon in southwestern Alabama, except that the strata are somewhat lighter in color. Downdip, in southern Alabama and panhandle Florida, the Lisbon grades into gray, greenish-gray, or light-brown calcareous, glauconitic clay that contains thin to thick beds of fine-grained, calcareous, glauconitic sand and hard, sandy, glauconitic limestone. In this area contiguous to the Gulf Coast, the Lisbon cannot be differentiated from the Tallahatta.

To the east, the undifferentiated Lisbon-Tallahatta sequence grades into light-gray, glauconitic, argillaceous, somewhat sandy limestone that in turn grades into the Avon Park Formation. This light-colored, fine-grained limestone is also found throughout Georgia in a middip position between the calcareous clastic rocks of the outcropping or updip Lisbon and the pelletal Avon Park Formation. Like the Lisbon-Tallahatta sequence along the Gulf Coast, this limestone facies cannot be split into "Tallahatta" and "Lisbon" components.

In northeastern Georgia, the Lisbon consists mostly of light-gray argillaceous limestone and is underlain by clastic strata that are Tallahatta equivalents. To the northeast, the lower part of the argillaceous limestone becomes sandy, fossiliferous, and glauconitic and grades into the Warley Hill Marl of South Carolina. The upper part of the argillaceous limestone grades into the Santee Limestone of South Carolina, a slightly coarser, soft, cream to yellow, fossiliferous limestone that contains minor beds of glauconitic sand and clay.

Fauna considered characteristic of the undifferentiated clastic Lisbon-Tallahatta sequence in the study area include the Foraminifera *Asterigerina texana* (Stadnichenco), *Ceratobulimina stellata* Bandy, and *Globorotalia bullbrooki* Bolli. The ostracode *Leguminocythereis petersoni* Swain is also commonly found in these clastic middle Eocene strata.

GOSPORT SAND—In western Alabama, the uppermost part of the middle Eocene sequence consists of fine- to coarse-grained, glauconitic, fossiliferous sand and some beds of dark-colored shale. This unit, called the Gosport Sand, is thought to be local because it is no recognizable either in outcrop in central Alabama or i downdip wells. The strata called "Gosport" in th Savannah, Ga., area by Counts and Donsky (1963) ar included in the undifferentiated Lisbon-Tallahatta se quence of this report because their lithology is com pletely unlike that of the Gosport even though thei stratigraphic position is the same.

MCBEAN FORMATION—In northeast Georgia and i South Carolina, fine-grained, loose to semiconsolidat ed, slightly fossiliferous sand of middle Eocene ag occurs locally. This sand, called the McBean Forma tion, grades downward and seaward into calcareou clay that in turn grades into the upper part of th Santee Limestone. Like the Gosport, the McBean is c only local importance in the study area.

DEPOSITIONAL ENVIRONMENTS—The outcropping Ta lahatta and Lisbon Formations were deposited in sha low marine to marginal marine environments. Tran gression of the sea during the middle Eocene was mor extensive than it was during either Paleocene or earl Eocene time. Shallow marine Lisbon-Tallahatta rock extending to the shore of the present Gulf of Mexic show that the middle Eocene sea floor sloped ver gently there and that shallow marine waters extende over a wide area.

The Avon Park Formation, like the Oldsmar an Cedar Keys Formations, was deposited on a shallov warm-water carbonate bank. Some of the evaporite that characterize the lower parts of the revised Avc Park Formation in west-central peninsular Floric may have formed in a tidal flat or sabkha environmen

The Congaree, Warley Hill, and Santee beds South Carolina were deposited as the result of a sing continuous transgression (Pooser, 1965). The Co garee represents basal clastic deposits. The Warle Hill was laid down in very shallow marine waters, ar the Santee was deposited in a shallow shelf, ope marine environment.

The Gosport Sand represents a regressive shallo marine to marginal marine deposit that was laid dov as the middle Eocene sea withdrew. The McBea likewise represents a regressive sand.

ROCKS OF LATE EOCENE AGE

Upper Eocene rocks underlie practically all of tl study area, except for local areas in peninsular Floric where they have been removed by erosion. In contra with older Tertiary units, strata of late Eocene ag consist of carbonate rocks throughout all of the stuc area except (1) in updip outcrop locales where th interfinger with clastic materials or have been weathered into a clayey residuum and (2) in western Alabama and much of the Florida panhandle, where the upper Eocene section consists mostly of fine clastic sediments. The late Eocene represents the most extensive and widespread transgression of Tertiary seas in the Southeastern United States.

The extent, configuration of the top, and area of outcrop of rocks of late Eocene age are shown on plate 8. In Alabama and the southwesternmost corner of Georgia, these rocks are found farther gulfward than the middle Eocene strata that they overlie in offlap relation. From Stewart County, Ga., northeast, however, upper Eocene strata overlap older beds. This onlap relation extends into part of South Carolina.

From an altitude of more than 400 ft above sea level in their area of outcrop in Georgia and South Carolina, upper Eocene beds generally slope gently seaward (pl. 8). This slope is interrupted in northern peninsular Florida by a widespread high area upon which the top of upper Eocene rocks rises to altitudes slightly above sea level. This high area has been called the Ocala uplift, but it is not a true uplift. Even though this feature appears as a high on the upper Eocene top, it is not a structural high on the tops of older units (compare pl. 8 with pls. 3, 4, and 6). The upper Eocene may be high on the Ocala "uplift" because of either (1) deposition of an anomalously thick section of upper Eocene rocks in this area, (2) differential compaction, or (3) postdepositional erosion. The Ocala "uplift," regardless of its origin, is not related to the Peninsular arch. The fact that the effect of the Peninsular arch is not apparent on maps of the top of upper Eocene or younger rock shows that the arch ceased to be an active structure after middle Eocene time.

Some of the major structural lows in the study area, however, continued to actively subside during late Eocene time. Plate 8 shows a steep slope on the upper Eocene top in westernmost panhandle Florida and southern Alabama that reflects the influence of the Gulf Coast geosyncline. The negative area in Gulf and Franklin Counties in panhandle Florida is the Southwest Georgia embayment, and the low centered in Glynn County, Ga., is the Southeast Georgia embayment. The South Florida basin is also shown on plate 8 as a low area in southwestern peninsular Florida. The poor definition of the unnamed low area in east-central Georgia and its contiguous high in South Carolina (pl. 8) indicate that these features were not active "warps" in the late Eocene.

There are a number of small- to medium-sized faults shown on plate 8 that first occur in the late Eocene. Most of these are in central and northern peninsular Florida. Like the Gulf Trough graben system (running northeast across central Georgia on pl. 8), which affects only middle Eocene and younger rocks, these faults in central and northern Florida appear to be shallow features that die out with depth. The locations of the small faults are better known, and the topography shown on plate 8 for the upper Eocene top is more deatailed than that shown for deeper horizons because upper Eocene strata provide a prolific source of ground water and are therefore more intensively drilled than older units.

Upper Eocene rocks crop out more extensively than any other Tertiary unit except the Miocene. In much of their updip outcrop area, they consist largely of calcareous clastic rocks. In southwestern Georgia, easternmost Alabama, and contiguous counties in Florida, uppermost Eocene rocks consist of soft to well-indurated limestone that has a thin to moderately thick (less than 10 to more than 50 ft) clayey residuum developed on it. This residuum masks and subdues the karst topography that drilling shows is developed on the limestone surface there. In western peninsular Florida, upper Eocene sediments consist mostly of highly fossiliferous, soft limestone that shows a highly irregular, karstic, often cavernous surface resulting from extensive dissolution of the rock. Locally, in parts of the Florida peninsula, upper Eocene rocks have been completely removed by erosion, and rocks of middle Eocene age are exposed through the late Eocene surface (pl. 8).

The maximum measured depth to the top of the upper Eocene is about 3,380 ft below sea level in well ALA-BAL-30 in southern Baldwin County, Ala. The maximum contoured depth is about 4,000 ft, just to the southwest of this well. The top of rocks of late Eocene age is more than 1,000 ft below sea level in the Southwest Georgia embayment, more than 700 ft in the Southeast Georgia embayment, and more than 1,200 ft in the South Florida basin. In north-central Florida, the upper Eocene top is at or slightly above mean sea level over a wide area and slopes seaward in all directions from this high. Locally, the upper Eocene top has been vertically displaced as much as 300 ft across some of the small faults that cut the unit.

The thickness of upper Eocene strata is shown on plate 9. In contrast with older Tertiary units, upper Eocene beds are comprised of carbonate rocks almost everywhere. Most of the contouring on plate 9 is based on well-point data. In areas of sparse well control, the thickness of rocks of late Eocene age has been estimated by subtracting contoured structural surfaces of the middle and upper Eocene (pls. 6, 8). The upper Eocene is generally 200 to 400 ft thick, with two major exceptions. In the Southwest Georgia embayment, these rocks are more than 800 ft thick, and in the central part of peninsular Florida, they are less than 100 ft thick in an area that trends east-west across the peninsula. There is much local variation in the thickness of the upper Eocene because of the effects of erosion and (or) dissolution of these rocks, especially in and near the places where they crop out.

OCALA LIMESTONE—Dall and Harris (1892) applied the name Ocala Limestone to the limestone exposed in quarries near Ocala in Marion County, Fla. These rocks were incorrectly correlated with strata in Alabama that were thought then to be Eocene but that are now known to be of Oligocene age. Cooke (1915) was the first to assign the Ocala to its correct upper Eocene stratigraphic position. Applin and Applin (1944) divided the Ocala into upper and lower members. This twofold division of the formation is still used by the U.S. Geological Survey at the time of this writing (1984). However, the Florida Bureau of Geology considers the Ocala to be a group consisting of, in ascending order, the Inglis, Williston, and Crystal River Formations, as Puri (1953b) proposed.

Puri's three formations cannot be recognized lithologically even at their type sections and cannot be differentiated in the subsurface. This author does not consider the Inglis, Williston, and Crystal River Formations to be either readily recognizable nor mappable, and the terms are not used in this report. As Applin and Applin (1944) recognized, the Ocala consists in many places of two different rock types. The upper part of the Ocala is a white, generally soft, somewhat friable, porous coquina composed of large Foraminifera, bryozoan fragments, and whole to broken echinoid remains, all loosely bound by a matrix of micritic limestone. This coquina is the typical Ocala of the literature and comprises much of the formation. The lower part of the Ocala consists of cream to white, generally fine grained, soft to semi-indurated, micritic limestone containing abundant miliolid remains and scattered large foraminifers. Locally, in southern Georgia, the lower part of the Ocala is slightly glauconitic. This lower fine-grained facies of the Ocala is not everywhere present and may locally be dolomitized wholly or in part. In southern Florida, the entire Ocala is composed of micritic to finely pelletal limestone in places. Because the twofold division of the Ocala is not everywhere recognizable and because the lower micritic unit is thin where it occurs, the two members are not differentiated in this report.

The Ocala Limestone is found throughout Florida (except where it has been locally removed by erosion) and underlies much of southeastern Alabama and the Georgia coastal plain. The Ocala is one of the most permeable rock units in the Floridan aquifer system. The surface of the formation is locally very irregular as a result of the dissolution of the limestone and t development of karst topography. Locally, the upp few feet of the Ocala in the subsurface consist of whi soft, clayey residuum. Where the formation is expos at the surface, such residuum may also be present (in southwestern Georgia), but the clayey material ocher to red there owing to the oxidation of the sm amounts of iron that it contains.

Fauna considered characteristic of the Ocala Lim stone include the Foraminifera *Amphistegina pinare sis cosdeni* Applin and Jordan, *Lepidocyclina ocala* Cushman, *L. ocalana floridana* Cushman, *Eponid jacksonensis* (Cushman and Applin), *Gyroidina cry talriverensis* Puri, and *Operculina mariannens* Vaughn. Although the foraminiferal genus *Asteroc clina* is not restricted to the late Eocene, it usually not found above the top of the Ocala in the study are The Ostracoda *Cytheretta alexanderi* Howe and Cha bers and *Jugosocythereis bicarinata* (Swain) are fou in shallower water parts of the Ocala as well as in i clastic equivalents.

MOODYS BRANCH FORMATION—In western panhand Florida, the Ocala thins and, although the upper pa of the formation retains its typical coquinoid chara ter, the lower part grades westward into soft gray cl and minor interbedded fine-grained sand. This litho gy is correlative with the outcropping Moodys Bran Formation of western Alabama, which consists greenish-gray, calcareous, glauconitic sand and cl and a few layers of sandy limestone.

YAZOO CLAY—The upper part of the Ocala in centr Alabama grades northward and westward through white, massive, fine-grained, clayey, glauconitic lim stone into the outcropping Yazoo Clay in weste Alabama and eastern Mississippi. The Yazoo can locally divided into four members (Murray, 1947 (from oldest to youngest): (1) the North Twistwoo Creek Clay, a bluish-gray, sandy, slightly calcareou fossiliferous clay; (2) the Cocoa Sand, a yellowish-gray fine- to medium-grained, massive, fossiliferous san (3) the Pachuta Marl, a light greenish-gray, claye fossiliferous, calcareous sand or sandy limestone; ar (4) the Shubuta, a light-gray to white, calcareou fossiliferous, sandy clay. These divisions of the Yaz can be traced in the subsurface for only a short di tance downdip from their area of outcrop.

Fauna considered to characterize the Yazoo Clay, i middip equivalents, and the basal clastic part of th Ocala in the Florida panhandle include the Foramin era *Bulimina jacksonensis* Cushman, *Robulus guttic status cocoaensis* (Cushman), and *Globigerina trip tita* Koch. Ostracoda that characterize these be include *Cytheretta alexanderi* Howe and Chamber

Clithocytheridea caldwellensis (Howe and Chambers), *C. garretti* (Howe and Chambers), *Jugosocythereis bicarinata* (Swain), and *Haplocytheridea montgomeryensis* (Howe and Chambers). The latter species ranges downward into middle Eocene beds but does not occur above the top of the upper Eocene.

BARNWELL FORMATION—The lower part of the Ocala Limestone grades laterally into more clastic rocks in northeastern Georgia. In the Savannah area, much of the lower part of the Ocala consists of light-brown, highly sandy, glauconitic, argillaceous limestone. This unit, unnamed at present, grades in turn to the north into the outcropping Barnwell Formation of eastern Georgia and southwestern South Carolina. The updip Barnwell consists of fine- to coarse-grained, gray, yellow, pink, and red arkosic sand and thin beds of light-gray to green, glauconitic, fossiliferous clay.

In parts of eastern Georgia, the Barnwell is divided into (1) a thin and locally occurring basal sand (possibly equivalent to the Clinchfield Sand), (2) a green to gray, sandy, locally glauconitic clay member (Twiggs Clay Member), and (3) an upper, massive, red, medium- to coarse-grained, locally clayey sand (Irwinton Sand Member). The Clinchfield sand and the members of the Barnwell Formation can be traced only a short distance downdip, where they grade into calcareous, argillaceous rocks that in turn grade seaward into the lower part of the Ocala Limestone.

COOPER FORMATION (LOWER MEMBERS) AND EQUIVALENT ROCKS—The upper part of the Ocala grades northward, by the addition of calcareous clay and the loss of large foraminifers, into a soft, white, argillaceous, sandy, slightly glauconitic, bryozoan-rich limestone that is the basal part of the Cooper Formation of South Carolina and northeastern Georgia. In South Carolina, the Cooper is divided into three members (Ward and others, 1979), the lower two of which are of late Eocene age. The uppermost member of the Cooper is of Oligocene age and is discussed in the Oligocene section of this report.

The basal Harleyville Member of the Cooper is a soft, clayey, micritic limestone that contains small amounts of glauconite and pyrite. A phosphate-pebble conglomerate is commonly found at the base of the Harleyville Member. The middle unit of the Cooper is the Parkers Ferry Member, a glauconitic clayey limestone that is highly fossiliferous. The Parkers Ferry Member represents the uppermost part of the late Eocene in South Carolina. The Cooper Formation is not subdivided in Georgia. Most of the Cooper in outcrop and in the shallow subsurface of Georgia is lithologically similar to the Parkers Ferry Member of South Carolina.

The updip equivalent of the Cooper Formation in Georgia is a medium- to coarse-grained, locally argillaceous and pebbly, massive red to reddish-brown sand. This unit, called the Tobacco Road Sand by Huddlestun and Hetrick (1978), is thought to be a marginal marine (lagoonal or estuarine) equivalent of the Cooper Formation. The Tobacco Road is of local importance only and is not recognizable in the subsurface.

Few cores or cuttings from wells that penetrated either the Barnwell Formation or the Cooper Formation and its equivalents were examined during this study. Although these strata are known to contain a sparse to well-developed microfauna in places, no species has been identified during this study as being characteristic of these formations.

DEPOSITIONAL ENVIRONMENTS—Practically all the rocks of late Eocene age in the study area were deposited in shallow, open to marginal marine environments. The Ocala Limestone was deposited in warm, shallow, clear water on a carbonate bank that was probably similar to the modern Bahama Banks. The basal part of the Ocala in western panhandle Florida and the Moodys Branch Formation, which is its updip equivalent, as well as the Yazoo Clay represent marginal marine (lagoon or estuary) to shallow, open-shelf conditions.

The Barnwell Formation and the Tobacco Road Sand were deposited in estuarine, sound, or lagoonal conditions. The Cooper Formation that lies downdip from these units represents shallow water, open marine conditions. The basal phosphate conglomerate of the Harleyville Member of the Cooper was deposited during transgression of the late Eocene sea.

OLIGOCENE SERIES

Rocks of Oligocene age are found over approximately two-thirds of the study area and occur in two separate large bodies. The more extensive area underlain by Oligocene rocks is a wide band that extends seaward from the outcrop of these rocks in Alabama, Georgia, and South Carolina. A second, somewhat smaller area of Oligocene strata covers the southwestern quarter of the Florida peninsula. Plate 10 shows the extent of these two main bodies of Oligocene rocks, the area where Oligocene strata crop out, and the configuration of the Oligocene surface. Throughout the study area, Oligocene rocks are in offlap relation to the upper Eocene and lie seaward of these older beds (compare pls. 8 and 10). Where Oligocene rocks are overlapped by Miocene sediments, the updip limit of the Oligocene is approximate because it is based on available well data; this approximate limit is shown as a dashed line on plate 10. The Oligocene Series consists of carbonate rocks throughout all of the study area except for southwestern Alabama, western panhandle Florida, and parts of northeastern Georgia and southwestern South Carolina, where clastic strata make up an important part of the Oligocene. The few scattered outliers of Oligocene lying between the two main bodies shown on plate 10, indicate that these rocks extended over a much wider area before being removed by erosion. Older rocks are exposed at scattered places within the widespread but generally thin body of the Oligocene in Georgia, where erosion has removed all of the Oligocene locally. The locations of most of the Oligocene outliers and the places where Oligocene rocks have been stripped are based on well data compiled for this study. A few of these features, however, are located from published sources, and thus lie in places where no well control is shown on plate 10. Erosional remnants to the north and west of the general updip limit of the Oligocene show that these rocks once extended over a much wider area.

Both large- and small-scale structural features affect the configuration of the Oligocene top. Large-scale features include (pl. 10) (1) the steep gulfward slope of the unit in southwestern Alabama, which reflects subsidence of the Gulf Coast geosyncline, (2) the low area in southern Gulf County, Fla., that represents the Southwest Georgia embayment, (3) the negative area in Glynn County, Ga., and adjacent counties that is the Southeast Georgia embayment, and (4) a low area in southwestern peninsular Florida that may represent a remnant of the South Florida basin. The northwest-southeast orientation of the axis of the South Florida basin is different from its alinement on the surface of older rock units (compare, for example, pls. 8 and 10). The high area shown on the Oligocene surface along the Gulf of Mexico parallel to the South Florida basin is not present on the upper Eocene top. This high probably acted as a sill or barrier during Oligocene time and partly restricted open circulation between the South Florida basin and the ocean. Smaller structural features shown on plate 10 include the northeast-trending series of small grabens in central Georgia that are collectively called the Gulf Trough and a coast-parallel normal fault that extends from Indian River County southeast through Martin County, Fla. The Oligocene has been eroded from the upthrown side of this fault but is preserved on its downthrown side.

The Oligocene top slopes generally seaward from a high of more than 300 ft above sea level in the unit's outcrop area in central Georgia to slightly more than 600 ft below sea level in both the Southwest and Southeast Georgia embayments. This general seaward slope is interrupted in northern Florida by a high area extending from Leon County eastward to Columbia County, where Oligocene rocks crop out. From a ond outcrop area that extends southward from Ci to Hillsborough Counties, Fla., Oligocene rocks s into the South Florida basin, where the Oligocene is more than 900 ft below sea level. The maxin measured depth to the top of the Oligocene is ab 2,680 ft below sea level in well ALA-BAL-30 in sou ern Baldwin County, Ala. The maximum contou depth is below 3,200 ft, to the southwest of this w Although the top of the Oligocene is affected locally erosion and karst topography, it is not as irregular the top of upper Eocene strata.

The thickness of the Oligocene Series is shown plate 11. Most of the contouring shown on this plat based on well data. Where wells are scattered, thickness of Oligocene rocks has been estimated subtracting contours that represent the tops of up Eocene and Oligocene rocks (pls. 8 and 10). Oligoc strata are generally less than 200 ft thick in the stu area. Exceptions are southwestern Florida, wh these rocks are more than 400 ft thick; southern C and Franklin Counties, Fla., where they are more th 600 ft thick; and the southernmost part of Alabar where they are more than 800 ft thick. These th areas represent the South Florida basin, the Southw Georgia embayment, and the northeastern rim of Gulf Coast geosyncline, respectively. Through most of eastern Georgia and all of South Carolina, thickness of the Oligocene Series only locally exce 100 ft and is generally 50 ft or less.

Suwannee Limestone and equivalent rocks

The name "Suwannee Limestone" was proposed Cooke and Mansfield (1936, p. 71) for "yellowish li stone typically exposed along the Suwannee River Florida, from Ellaville...almost to White Springs. They considered these beds to be of Oligoce (Vicksburgian) age rather than Miocene as previc investigators had postulated. Cores and well cuttin examined during this study show that the Suwann usually consists of two rock types: (1) cream to ta crystalline, highly vuggy limestone containing pror nent gastropod and pelecypod casts and molds and white to cream, finely pelletal limestone containi small foraminifers and pellets of micrite bound by micritic to finely crystalline limestone matrix. . though these two rock types are complexly interb ded in places, the pelecypod cast-and-mold limestone more characteristic of the upper part of the Suwanr and is the lithology most representative of the ent formation in most of Georgia and eastern panhan Florida. The micritic pelletal limestone that is char teristic of the lower part of the Suwannee is loca found higher in the formation in southwestern Florida. Because the Suwannee, like the Ocala, cannot be divided everywhere, the two facies have not been delineated in this report.

The upper part of the Suwannee has been locally silicified, and this chert-rich horizon was named the Flint River Formation in Georgia. These silicified beds are rarely found in the subsurface and appear to merely represent local diagenetic conditions rather than a widespread mappable variation within the Suwannee. The term Flint River is accordingly not considered to be a valid formational name in this report.

The upper part of the Suwannee in the Georgia subsurface commonly consists of medium to coarsely crystalline, light-brown to honey-colored, saccharoidal, vuggy dolomite. The erosional remnants of Suwannee preserved as outliers several miles distant from the main bodies of Oligocene rocks (pl. 10) and consisting of either limestone or dolomite show that marine Oligocene strata once covered the entire study area. Locally, the cast-and-mold facies of the Suwannee contains fine-grained sand. Very locally, the micritic pelletal facies contains trace amounts of fine- to medium-grained, light- to dark-brown phosphate. In outcrop, the Suwannee locally weathers to a nodular, rubbly surface owing to the removal of layers, lenses, and stringers of soft argillaceous limestone.

The Suwannee grades northward in northeastern Georgia and South Carolina into part of the Cooper Formation by the addition of clay and sand and the loss of limestone. Westward, across panhandle Florida and southern Alabama, the Suwannee appears to grade into the lower part of the Bucatunna Formation. In that area, the Suwannee consists of tan limestone, dolomitic limestone, and light-colored calcareous clay. Some of these beds were called "Byram" or "Glendon" by early workers (Cooke and Mossum, 1929; Cooke, 1945) primarily on the basis of their stratigraphic position. Some faunal aspects of the Suwannee in Florida are Chickasawhayan (late Oligocene); others are Vicksburgian (early Oligocene). The unit is thus interpreted in this report as spanning both ages (pl. 2). The Suwannee in Georgia is thought to be late Oligocene (Huddlestun, 1981).

Microfauna considered characteristic of the Suwannee include the larger Foraminifera *Lepidocyclina leonensis* Cole and *L. parvula* Cole as well as the small Foraminifera *Pararotalia byramensis* Cushman and *P. mexicana mecatepecensis* Nutall, which are closely related. Although the genus *Miogypsina* ranges into younger strata in the central Gulf Coast, it does not occur above the top of the Suwannee in the study area. The larger Foraminifera *Discorinopsis gunteri* Cole, *Dictyoconus cookei* (Moberg), and *Coscinolina floridana* Cole are commonly found in the Suwannee, but these three species are also found lower in the section in the middle Eocene Avon Park Formation. Some authors think that these species have been reworked from the Avon Park into the Suwannee. Others think that they are merely long-ranging species that are "facies seekers." That is, their reappearance in the Suwannee means nothing more than the reestablishment of environmental conditions like those in which the Avon Park was deposited. Most individuals of these three species from the Suwannee examined during this study appeared fresh and unaltered, and the species are widespread throughout the cast-and-mold facies of the formation. In addition, there is no apparent Avon Park source from which these fossils could have been reworked. The isolated patches of Avon Park that are exposed through a cover of upper Eocene sediments (pl. 8) are too small and too scattered to provide a source from which these widely distributed Foraminifera could have been reworked into the Suwannee. This author therefore believes that these are long-ranging species indigenous to the Suwannee Limestone.

Bumpnose, Red Bluff, and Forest Hill Formations

In panhandle Florida, the Oligocene Series thickens considerably (pl. 11) and becomes increasingly clastic westward. In addition, some carbonate units that are older than the Suwannee are present at the base of the Oligocene (pl. 2). One such unit is the Bumpnose Formation, a name applied by Moore (1955) to a soft, white, somewhat glauconitic, highly fossiliferous (pelecypod and gastropod casts and molds and bryozoan and foraminiferal remains) limestone that crops out in central Jackson County, Fla. Moore thought that the Bumpnose represented the uppermost part of the late Eocene but recognized that many of its faunal elements were Oligocene. Subsequent work by Hazel and others (1980) confirmed the findings of MacNeil (1944) and Cooke (quoted by Moore, 1955, p. 38) that the beds that Moore called Bumpnose correlate with the Red Bluff Formation of Alabama of known Oligocene age. The Bumpnose in its type area is very likely a transitional unit between the late Eocene and early Oligocene. The Bumpnose Formation, however, is placed in the Oligocene in this report because carbonate rocks in western Alabama that are in the same stratigraphic position as the Bumpnose and that can be shown to correlate with it are of Oligocene age (Hazel and others, 1980).

The Bumpnose grades northwestward into the Red Bluff Formation, which is mostly dark-gray to brown, fossiliferous, glauconitic clay that contains some iron-about 13,000 ft^2/d (Ryder, 1982). Hawthorn limestone beds that are local aquifers yield up to 750 gal/min (Boggess, 1974).

FLORIDAN AQUIFER SYSTEM

GENERAL

The Floridan aquifer system is a thick sequence of carbonate rocks generally referred to in the literature as the "Floridan aquifer" in Florida and the "principal artesian aquifer" in Georgia, Alabama, and South Carolina. As defined in this report, the Floridan aquifer system encompasses more of the geologic section and extends over a wider geographic area than either the Floridan or the principal artesian aquifer, as those aquifers have been described in the literature. Figure 7 shows the geologic formations in Florida and southeastern Georgia that were called "principal artesian formations" by Stringfield (1936), those that were included in the "Floridan aquifer" as defined by Parker and others (1955), and those placed in the "principal artesian aquifer" as defined by Stringfield (1966). Subsequent deep drilling and hydraulic testing have shown that highly permeable carbonate rocks extend to deeper stratigraphic horizons than those included in either the "Floridan" or "principal artesian" aquifers as originally described. Accordingly, this author (cited by Franks, 1982) extended the base of the Floridan aquifer downward to include part of the upper Cedar Keys Limestone (fig. 7). Limestone and dolomite beds that commonly occur at the base of the Hawthorn Formation have been included as part of the "Floridan" or "principal artesian" aquifer in most previous reports. However, data collected for the present study show that, except very locally, there are no high-permeability carbonate rocks in the lower part of the Hawthorn Formation that are in direct hydraulic contact with the main body of the Floridan aquifer system.

The Hawthorn Formation was thus excluded from the aquifer system in a report by Miller (1982a) that was one of a series of several interim reports published during the present study. In these interim reports, the aquifer system was called the "Tertiary limestone aquifer system of the Southeastern United States." This cumbersome, albeit more accurate, terminology has subsequently been abandoned, and the aquifer system is referred to in this professional paper as the "Floridan aquifer system" (see Johnston and Bush, 1985 for a more detailed history of the terminology applied to the aquifer system).

The Floridan aquifer system is defined in this report

EPOCH		Stringfield (1936) Formation	Stringfield (1936) Aquifer	Parker and others (1955) Formation	Parker and others (1955) Aquifer	Stringfield (1966) Formation	Stringfield (1966) Aquifer	Miller, in Franks (1982) Formation	Miller, in Franks (1982) Aquifer	Miller (1982 a,c) Formation	Miller (1982 a,c) Aquifer system	This Report Formation	This Report Aquifer system
MIOCENE	Middle	Hawthorn Formation		Hawthorn Formation	Where Permeable	Hawthorn Formation		Hawthorn Formation	Where Permeable	Hawthorn Formation		Hawthorn Formation	
MIOCENE	Early	Tampa Limestone	Principal artesian formations	Tampa Limestone	Floridan aquifer	Tampa Limestone	Principal artesian aquifer	Tampa Limestone	Where Permeable	Tampa Limestone	Where Permeable	Tampa Limestone	Where Permeable
OLIGOCENE		Oligocene Limestone		Suwannee Limestone		Suwannee Limestone		Suwannee Limestone	Floridan aquifer	Suwannee Limestone	Tertiary limestone aquifer system	Suwannee Limestone	Floridan aquifer system
EOCENE	Late	Ocala Limestone		Ocala Limestone		Ocala Limestone		Ocala Limestone		Ocala Limestone		Ocala Limestone	
EOCENE	Middle			Avon Park Limestone Lake City Limestone		Avon Park Limestone Lake City Limestone		Avon Park Lake City Limestones		Avon Park Lake City Limestones		Avon Park Formation	
EOCENE	Early					Oldsmar Limestone		Oldsmar Limestone		Oldsmar Limestone		Oldsmar Formation	
PALEOCENE								Cedar Keys Limestone		Cedar Keys Limestone		Cedar Keys Formation	

Figure 7.—Comparison of aquifer terminologies.

as a vertically continuous sequence of carbonate rocks of generally high permeability that are mostly of middle and late Tertiary age and hydraulically connected in varying degrees and whose permeability is, in general, an order to several orders of magnitude greater than that of those rocks that bound the system above and below. As plate 2 shows, the Floridan aquifer system includes units of late Paleocene to early Miocene age. Very locally, in the Brunswick, Ga., area, the entire Paleocene section plus a thick sequence of rocks of Late Cretaceous age are part of the aquifer system. In and just downdip of the area where the aquifer system crops out, the entire system consists of one vertically continuous permeable unit. Farther downdip, less permeable carbonate units of subregional extent separate the system into two aquifers, herein called the Upper and Lower Floridan aquifers (fig. 8). These less permeable units may be very leaky to virtually nonleaky, depending on the lithologic character of the rock comprising the unit. Because they lie at considerable depth, the hydrologic character and the importance of the subregional low-permeability units are known from only a few scattered deep test wells. Local low-permeability zones may occur within either the Upper or the Lower Floridan aquifer. In places (for example, southeastern Florida), low-permeability rocks account for slightly more than half of the rocks included in the aquifer system.

Even though the rocks that comprise the base of the Upper Floridan aquifer are not everywhere at the same altitude or geologic horizon or of the same rock type, the presence of a middle confining unit over about two-thirds of the study area has led to a conceptual model for the Floridan aquifer system that consists of two active permeable zones (the Upper and Lower Floridan aquifers) separated by a zone of low permeability (a middle confining unit). Because of this simplified layering scheme, it is necessary to greatly generalize the highly complex sequence of high- and low-permeability rocks that comprise the aquifer system. Local confining beds (see, for example, cross section E-E', pl. 21) are either disregarded because they are regionally unimportant or lumped with one of the major layers. The purpose of the conceptual model, and of the digital computer model derived from it and described by Bush and Johnston (1985) is to portray the major aspects of ground-water flow within the Floridan aquifer system. In like manner, the descrip-

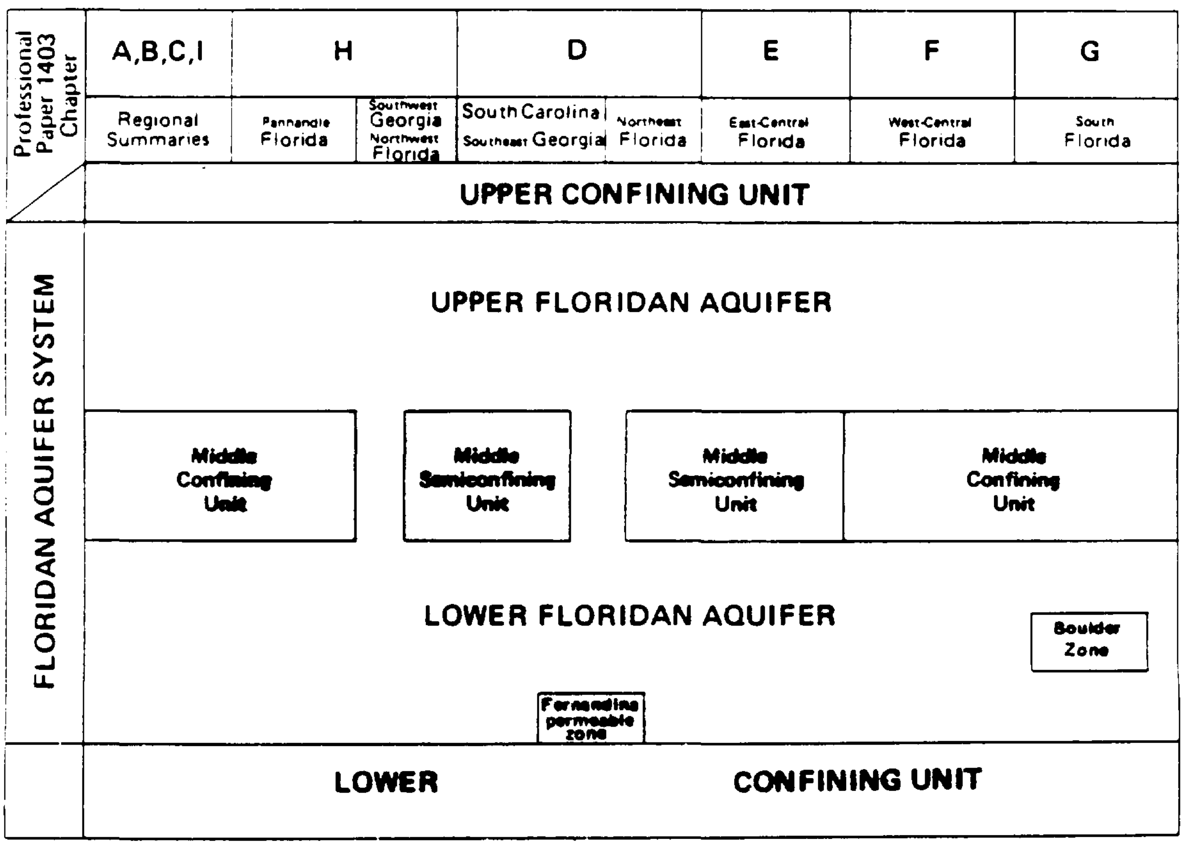


Figure 8. Aquifers and confining units of the Floridan aquifer system.

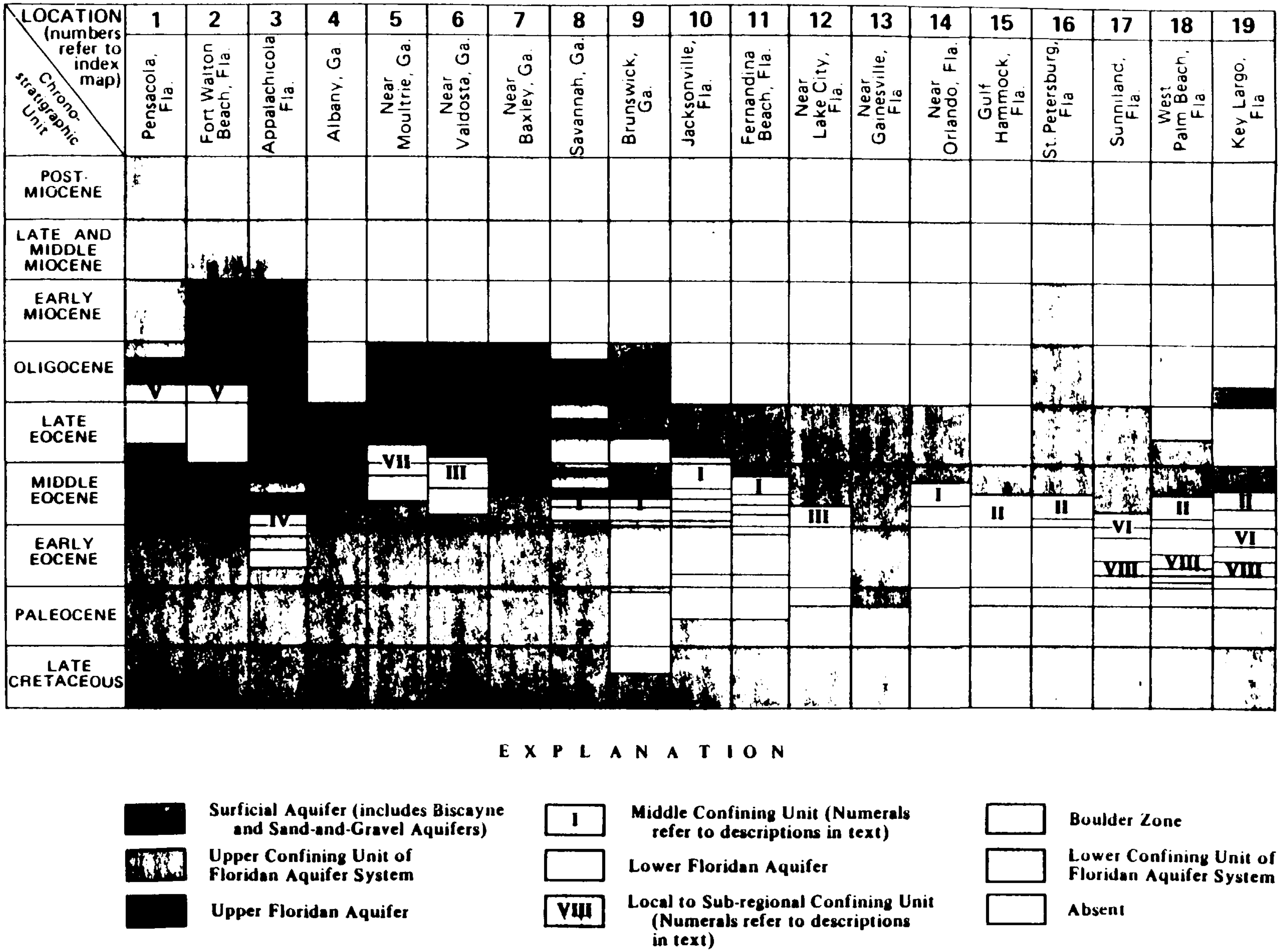
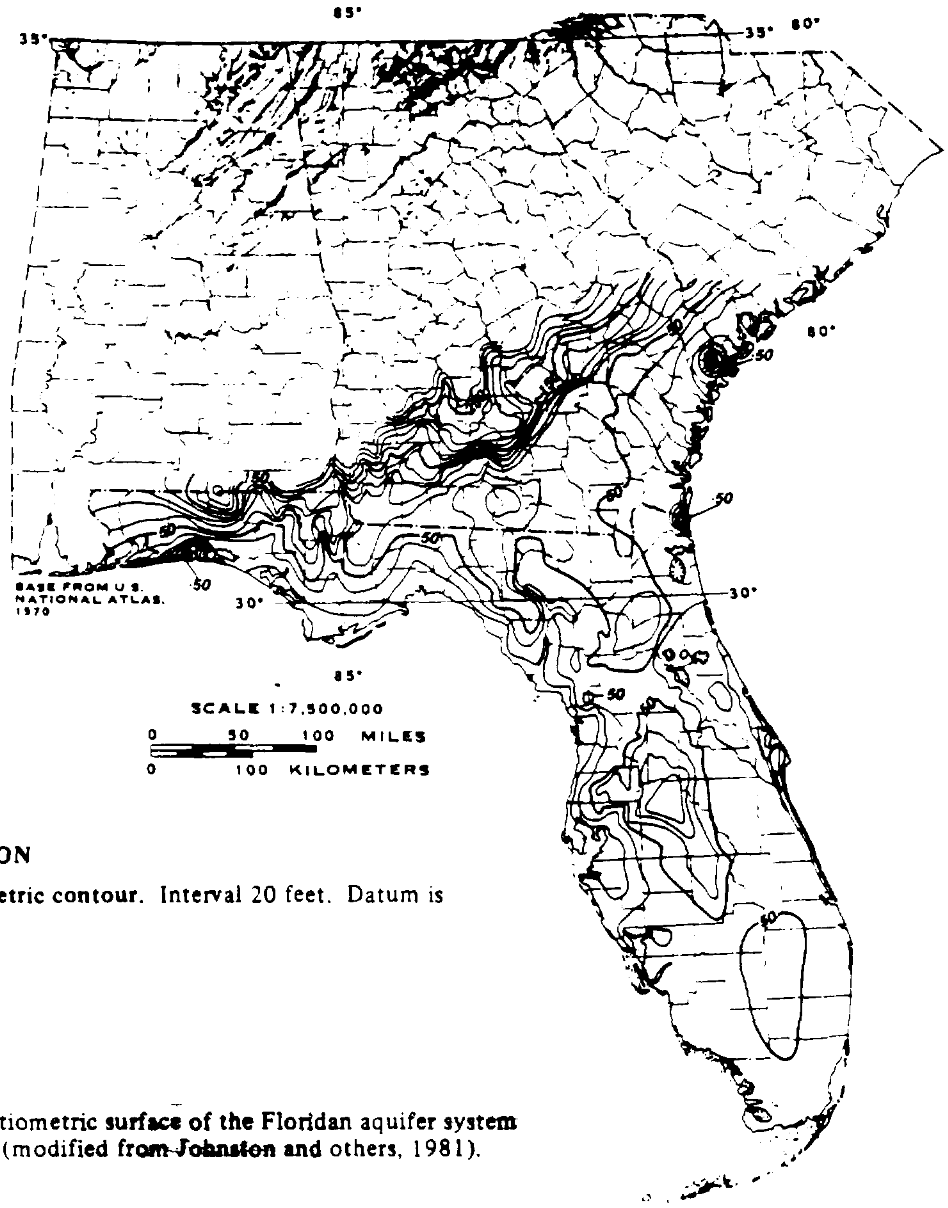


Figure 9. Relation of time-stratigraphic units to the Floridan aquifer system, its component aquifers, and its confining units.



EXPLANATION

—150— **Potentiometric contour.** Interval 20 feet. Datum is sea level

Figure 10. Potentiometric surface of the Floridan aquifer system in May, 1980. (modified from Johnston and others, 1981).

ment, and where they occur, the upper few hundred feet of the aquifer system is highly permeable, regardless of which time-stratigraphic unit it lies within. Fault movement has accordingly juxtaposed rocks of similar permeability and has resulted in only a slight difference in the thickness of the aquifer system. The ground-water flow system is accordingly unaffected.

When the small northeast-trending grabens shown in central Georgia on plate 26 are taken together, they represent a negative feature called by Herrick and Vorhis (1963) the "Gulf Trough of Georgia," a name subsequently shortened to "Gulf Trough" (Hendry and Sproul, 1966). Herrick and Vorhis did not postulate faulting as the cause of the Gulf Trough. Gelbaum (1978) and Gelbaum and Howell (1982), however, indicated that faulting could have formed many if not all of the small elongate basins that constitute the Gulf Trough, an interpretation with which this author agrees. In contrast to the Florida faults discussed above, the faults bounding the Gulf Trough grabens show considerable vertical displacement. The graben system affects the permeability characteristics, the thickness, and the configuration of the top of the Floridan aquifer system, and is also evident on maps of the tops and thicknesses of stratigraphic units ranging in age from middle Eocene to middle Miocene. Limestone units that are part of the aquifer system are less permeable within the Gulf Trough those than on either side (Gelbaum and Howell, 1982), and the system is thin within the trough (pl. 27).


SOUTH CAROLINA
PICKENS
CHEROKEE
YORK
35°
UNION
CHESTER
LANCASTER
CHESTERFIELD
ANDERSON
LAURENS
FAIRFIELD
KERSHAW
DARLINGTON
DILLON
NEWBERRY
LEE
ABBEVILLE
MARION
LEXINGTON
COLUMBIA
SUMTER
34°
EDGEFIELD
CLARENDON
WILLIAMSBURG
CALHOUN
AIKEN
COLUMBIA
GEORGETOWN
79°
ORANGEBURG
BERKELEY
BARNWELL
BAMBERG
DORCHESTER
BURKE
ALLENDALE
100
33°
HAMPTON
500
80

U/D Fault – Vertical or nearly so

U Upthrown side

D Downthrown side

Area where Floridan aquifer system is thin due to undissolved intergranular gypsum

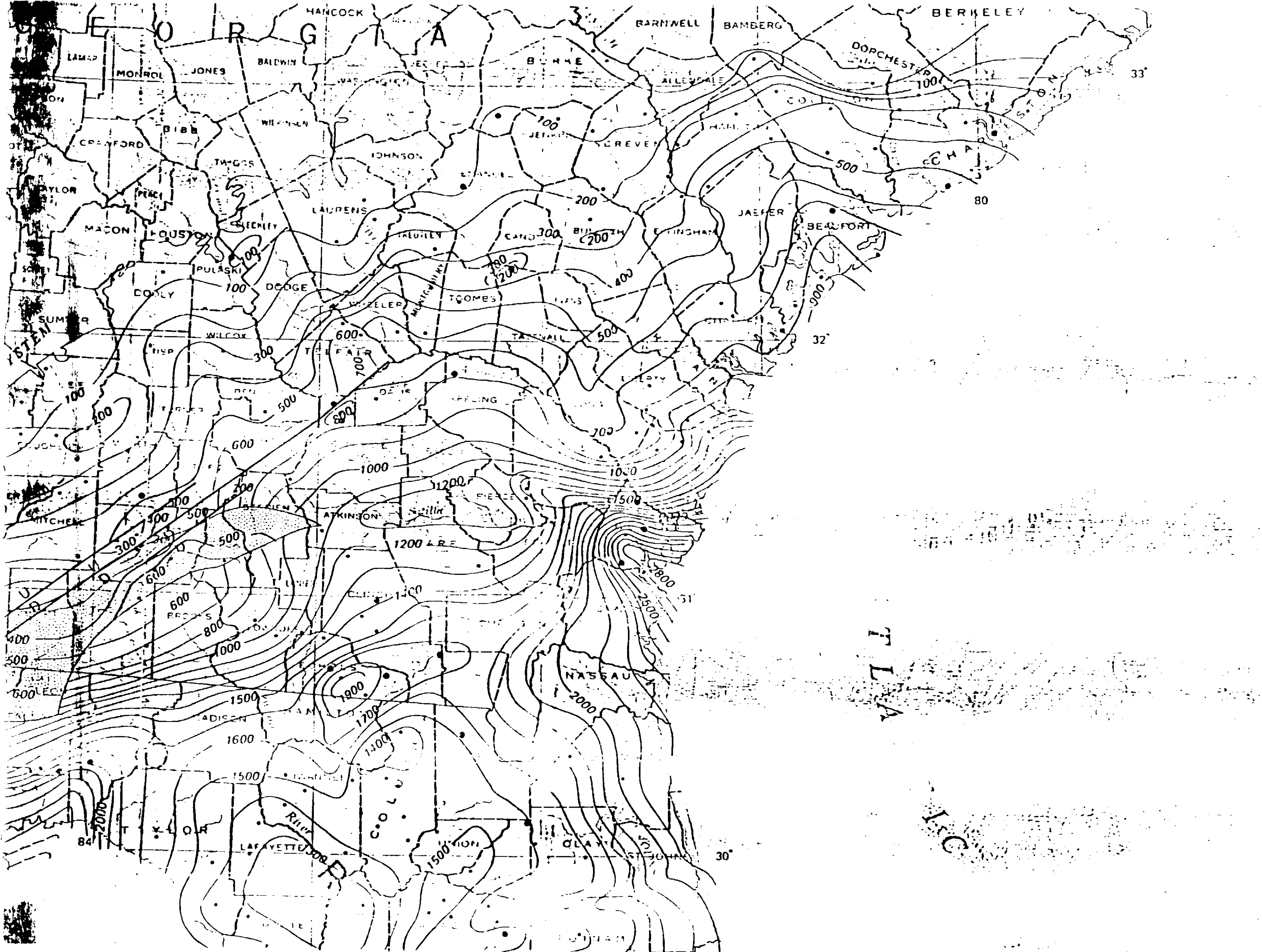
• Well control point

SCALE 1:2,000,000

0 10 20 30 40 50 100 MILES

0 10 20 30 40 50 100 KILOMETERS

Thickness of the Floridan aquifer system.



GEORGIA
HANCOCK
BARNWELL
BAMBERG
BERKELEY
DORCHESTER
LAMAR
MONROE
JONES
BALDWIN
BURKE
ALLENDALE
BIBB
CRAWFORD
JOHNSON
MACON
HOUSTON
LAURENS
PULASKI
DODGE
TOOMBS
WILCOX
TELFAIR
SCREVEN
JASPER
BEAUFORT
ATKINSON
PIERCE
Satilla
BROOKS
NASSAU
TAYLOR
LAFAYETTE
River
33°
32°
30°
80
84
100
200
300
400
500
600
700
800
900
1000
1200
1400
1500
1600
1700
1900
2000
2500
2800

REFERENCE # 24

Developments in Soil Science 5A

SOIL CHEMISTRY
A. Basic Elements

EDITED BY

G.H. BOLT and M.G.M. BRUGGENWERT

CONTRIBUTING AUTHORS:

J. BEEK
G.H. BOLT
M.G.M. BRUGGENWERT
F.A.M. DE HAAN
A. KAMPHORST
I. NOVOZAMSKY

Department of Soil Science and Plant Nutrition,
Agricultural University of Wageningen, The Netherlands

N. VAN BREMEN
R. BRINKMAN

Department of Soil Science and Geology,
Agricultural University of Wageningen, The Netherlands

P.J. ZWERMAN

Department of Agronomy, Cornell University, Ithaca, N.Y., U.S.A.

ELSEVIER SCIENTIFIC PUBLISHING COMPANY
Amsterdam — Oxford — New York 1976

ELSEVIER SCIENTIFIC PUBLISHING COMPANY
335 Jan van Galenstraat
P.O. Box 211, Amsterdam, The Netherlands

AMERICAN ELSEVIER PUBLISHING COMPANY, INC.
52 Vanderbilt Avenue
New York, New York 10017

ISBN: 0-444-41435-5

Printed in The Netherlands

PREFACE

The prese
undergradua
syllabi cover
cultural Uni
and Irrigati
multipurpos
self-supporti
sequences 1
independent

In selectir
to use the b
to the histo
came first. A
gradually, u
tempted to i
For a bas
velopment i
back' into t
a process o
disconnecte
a better cha
aspects of s
later more f
paratively h
when attem
While str
information
able length
chemistry h
sections me
of basic ch
thus be viev
be skipped
problems h
able to mak
The appr
chapter 10)
were involv
Soil Science
ones that r
sciences for

CHAPTER 10

POLLUTION OF SOIL

F.A.M. de Haan and P.J. Zwerman

Very briefly soil pollution could be typified as the malfunctioning of soil as an environmental component following its contamination with certain compounds particularly as a result of human activities. Unfortunately this statement throws up more questions than it answers. This is particularly the case when it is attempted - in view of the presumed undesirability of soil pollution - to specify limits as to permissible and non-permissible human interference with soil. Such limits are the necessary prerequisites of any legislative action undertaken for protective purposes.

The reason for the above lack of clarity is all too obvious. In order to establish present - or predict future - malfunctioning of soil, one would have to know precisely how soil functions as an environmental component, both for 'natural' and 'man-made' conditions. In addition it would be required to extrapolate this knowledge to all those situations involving the presence of 'contaminants' in order to see whether these could possibly interfere, and if so at what levels. Further dissection of the problem then shows that the functioning of soil as an environmental component is manyfold - granted that its role as a 'support' for the growth of plants is a major one - while the term 'contaminant' is often ill-defined as many compounds which are present regularly in particular soils and are even necessary in small amounts, may become inhibitive beyond certain limits. Finally the phrase 'resulting from human activities', though inferring a possibility of terminating such activities if adversely affecting the functioning of soil, does not necessarily point to the desirability of stopping these, as many human activities were designed to enhance the functioning of soil in certain aspects, though admittedly they could lead to undesirable effects in others.

A typical example is here the introduction of irrigation practices. Designed to counter the malfunctioning of soil because of a deficit of water for sustaining satisfactory crop growth, these often tend to lead to the accumulation of salts, locally or regionally, which are in fact contaminants leading to malfunctioning. As such, soil salinization as a result of irrigation practice could be regarded as one of the eldest specimen of soil pollution, in contrast to forms of salinization occurring at natural conditions without human influence.

Clearly, any effort to discuss the pollution of soil within one chapter must montmorillonite is in accordance with preference expectations. The slight preference for Ba^{2+} over Ni^{2+} is in agreement with the hydrated ion sizes of 5 and 6 Å, respectively. Under normal conditions the total amount of Ni adsorbed is very small only because of the low solution concentrations. This is not so for 'serpentine' soils in which the Ni-concentration may be up to 300 - 700 ppm in the soil solution.

A first decrease in the Ni toxicity of high Ni soils can be obtained by the addition of phosphates. The formation of lowly soluble nickel phosphates like $Ni_3(PO_4)_2.8H_2O$ and $Ni_3(PO_4)_2.2NiHPO_4$ induces a considerable decrease of the Ni concentration in the soil solution (Pratt et al., 1964). This mechanism does, however, not explain the normal Ni levels in soil which are around 0.005 to 0.050 ppm Ni in solution. Trinickelphosphates would allow a Ni concentration of 1 ppm and up, at pH values of 7 and below. Probably silicate ions govern the Ni concentration in soil solution, immobilization of Ni thus being caused by the formation of nickel silicate minerals. If so, the abundance of silicate ions in soils provides an almost infinite storage capacity when time is available for the formation of these nickel solids. Like Cd^{2+} and Cu^{2+}, also Ni^{2+}, however, is susceptible to chelation which may considerably affect its deplacement in soils.

10.4.9. Pb, lead

Most lead is used in the automobile industry, in the production of batteries and as the anti-knock gasoline additives tetraethyl lead and tetramethyl lead. To a lesser degree, the application of lead containing pesticides in agriculture causes a Pb burden on the environment. Pb application in pigments and plumbing is relatively small.

A distribution of total industrial lead consumption over different categories in the USA is presented in Table 10.3.

TABLE 10.3.

Percentual distribution of industrial lead consumption in the USA.

Branch	Percent
batteries	37
gasoline additives	23
metal products	19
ammunition	7
solder	6
pigments	4
brass and bronze	4

Although the total amount used is highest in batteries, this type of lead application has little bearing only on Pb dispersion in the environment. It is especially the gasoline additives that cause major discharges.

Gasoline combustion primarily causes an air pollution problem. The lead particles, however, reach the soil surface, especially in precipitation, and thus a soil pollution problem is induced. When it became apparent that Pb may cause health hazards, research about Pb effects on the environment has initially been centered around dense traffic areas. Figure 10.6 presents average values on lead contents in topsoil samples in Illinois, USA. The area of relatively high Pb content coincides with the main traffic lines between Chicago and St. Louis.

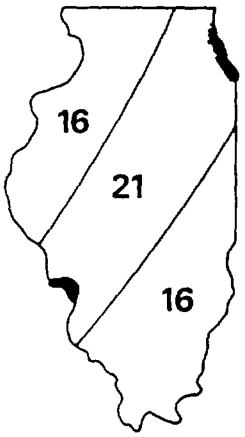


Fig. 10.6. Lead content in ppm of surface soils in Illinois, USA (Alexander, 1971)

Directly along a roadside in the Los Angeles metropolitan area Pb contents in soil as high as 2,400 ppm have been reported (Lagerwerff and Specht 1970).

In a similar way as was done for Cd it could be shown that the ingestion of Pb by people living in the vicinity of a Lead-Zinc smelter is at least 50% higher than normal. Too high Pb intake by man (and animals) may lead to toxic effects following accumulation in liver, kidneys and bones. Largest intake under normal conditions is by food, especially in the form of meat and vegetables. Daily intake levels from food are on the average around 300 μg, from air 10 - 100 μg. It is assumed that the solid food lead intake should not exceed 600 μg per day (Kehoe 1966). This makes the Pb content in plants and the Pb uptake by plants of direct importance for human health con-

[redacted]rally available for comparison. The complete anal... are presented i...
[redacted]pendix B

REFERENCE # 25

KIRK-OTHMER

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

THIRD EDITION

VOLUME 21

SILVER AND SILVER ALLOYS
TO
SULFOLANES AND SULFONES

A WILEY-INTERSCIENCE PUBLICATION
John Wiley & Sons
NEW YORK • CHICHESTER • BRISBANE • TORONTO • SINGAPORE

[redacted]

Library of Congress Cataloging in Publication Data:

Main entry under title:
Encyclopedia of chemical technology.

At head of title: Kirk-Othmer.
"A Wiley-Interscience publication."
Includes bibliographies.
1. Chemistry, Technical—Dictionaries. I. Kirk, Raymond Eller, 1890-1957. II. Othmer, Donald Frederick, 1904—
III. Grayson, Martin. IV. Eckroth, David. V. Title:
Kirk-Othmer encyclopedia of chemical technology.

TP9.E685 1978 660'.03 77-15820
ISBN 0-471-02074-5

Printed in the United States of America

A. Heller, *Acc. Chem. Res.* **14,** 154 (1981).
J. S. Connelly, ed., *Photochemical Conversion and Storage of Solar Energy*, Academic Press, New York, 1981.
A. J. Nozik, *Photoeffects at Semiconductor-Electrolyte Interfaces, ACS Symposium Series*, Vol. 146, American Chemical Society, Washington, D.C., 1981.

DAN HALACY
Solar Energy Research Institute

SOLDERS AND BRAZING ALLOYS

Solders

Soldering generally is used for making a mechanical, electromechanical, or electronic connection. This distinction is important because each application has its own specific requirements for solder alloys, fluxes, heating methods, and flux-residue removal. A mechanical joint made by a plumber in connecting two pieces of copper tubing is based on a tin–lead alloy as a filler metal to ensure that there are no leaks. A strong aggressive flux, a torch to heat the joint, and a damp cloth to remove excess flux residue are also used. Soldering the heating element contact to the external cord of a space heater may be considered as an electromechanical connection. In this case, a tin–lead-cored solder containing rosin flux and a soldering iron to melt the solder are used. The flux residue usually is not removed. Electronic connections are best exemplified by those used to attach components to the conductor paths of a printed wiring assembly by wave soldering. The solder is a tin–lead alloy. The flux is either rosin or a water-soluble organic flux. The heat is supplied by the molten solder. After soldering, the assembly is in most cases carefully cleaned to remove any residues which would cause malfunctioning of the electronic assembly (see Electrical connectors; also Welding).

Some of the more common solder alloys, their melting points, and their uses are listed in Table 1.

Joints. ***Design.*** A good solder joint should be one that provides visual inspectability, electrical conductivity, mechanical strength, ease of manufacture, and simplicity of repair. Each of these characteristics is determined by the design and selection of materials. Visual inspection of the solder joint is the most widely used nondestructive method of inspection, and proper design allows for visual inspection (See Nondestructive testing). Electrical conductivity is important in electronic assemblies, and joint design should maximize wire-to-terminal contact with the solder serving to fill all spaces and as a protection against atmospheric corrosion. Solders should never be relied on to provide mechanical strength. The joint should be designed to assure that any mechanical or thermal stresses are absorbed by the terminal-wire and not by the solder fillet. Design should take into account the solderability of materials used, space

Table 1. Common Solder Alloys

Composition, at %						Melting	
Sn	Pb	Cd	Bi	Ag	Sb	range, °C	Use
63	37					183	eutectic solder for electronic application
60	40					183–190	high quality solder
50	50					183–216	general-purpose solder, plumbing
40	60					183–238	wiping solder, radiator solder
30	70					183–255	machine and torch soldering
20	80					183–277	automotive-body solder
95					5	235–240	refrigeration soldering
62	36			2		179	soldering silver surfaces
1	97.5			1.5		309	high temperature soldering
15.5	32		52.5			90	fusible links
13	27	10	50			70	low melting solder

available for cleaning, type of heating used, as well as many other factors. Finally, the design should provide for ease of repair and replacement of parts.

Surface Preparation. It is essential to good soldering that the metals to be joined are compatible with the solder and that the surface be solderable under the conditions being used. Not all metals can be wet by solder. Copper, copper alloys, mild steels, nickel, etc, can be soldered. Certain stainless steels, titanium, molybdenum, and other metals cannot be soldered. For those metals that cannot be soldered, it is usually feasible to apply solderable coatings by electrodeposition or cladding.

Once the selection of metals that are compatible with solder has been made, it is necessary to prepare these surfaces for soldering. Parts being joined must be clean; oil, grease, dirt, and organic soils inhibit soldering and must be removed. This is usually accomplished by removing the contaminant with an appropriate solvent. Oxides, sulfides, carbonates, and other reaction products of the base metals are nonsolderable and must be removed by mechanical means, ie, abrasion, or chemical means, ie, bright dips. Surface preparation should be accomplished just prior to the soldering operation. The solderability of parts that have been stored for periods of time can be assessed by certain test methods (1–2).

Fluxes. Despite careful and thorough preparation of the surfaces being joined, it is always necessary to use a flux during soldering. A flux performs the following three functions: reacts with and removes surface compounds, eg, oxides and sulfides; reduces the surface tension of the molten solder alloy; and prevents oxidation during the heating cycle by providing a surface blanket to the base metal and solder alloy. Fluxes range in activity from inorganic acids and salts, which are the strongest, to rosin, which is the weakest. Classification by chemical composition is most commonly used.

Inorganic. Most inorganic fluxes are a combination of salts and acids dissolved in water with a wetting agent. Zinc chloride, ammonium chloride, hydrochloric acid, stannous chloride, and others are used. These fluxes are used for difficult-to-solder metals and usually in mechanical soldering where corrosion is not a problem. They should not be used in electrical or electronic soldering because the residues are too corrosive and generally are difficult to remove.

Organic. Organic fluxes are of the water-insoluble (rosin) and water-soluble (organic acid) kinds. The large majority of fluxes in use are organic. Rosin fluxes have been the most commonly used fluxes for electronic and electromechanical joining. They are available in core solder as well as in liquid form. Rosin is a complex mixture of isomeric acids; the principal component is abietic acid. Rosin flux is inert, noncorrosive, and nonconductive in the cold solid state but is active in removing tarnish films when hot. However, for many applications rosin is not suitable as a flux because it is too slow for modern, high-speed soldering and not aggressive enough for poorly solderable components. This deficiency has been overcome to some extent by adding activators to the rosin. These materials are generally amine hydrohalides, organic acids, or combinations of them. There are three types of rosins: nonactivated, mildly activated, and activated. Federal Specification QQ-S-571 characterizes rosin (R), rosin, mildly activated (RMA), and rosin, activated (RA) (3). For very high reliability equipment, only types R and RMA are permitted, because their flux residues are considered safe even if present after a cleaning operation. Type RA may be used if careful cleaning of the residues is provided and the assembly meets the cleanliness criteria of MIL-P-28809 Par 3.7 (4) (see Terpenoids).

Water-soluble organic fluxes, which have been used in mechanical soldering for many years, have recently achieved popularity in electromechanical and electronic soldering. The impetus for the interest in water-soluble fluxes lies in the fact that the residues can be removed with water rather than with the solvents required by rosin fluxes. Because they are more aggressive than rosin fluxes, they are useful where marginally solderable surfaces are being soldered. Water-soluble organic fluxes are mixtures of organic acids, amine hydrohalides, and surfactants dissolved in water or alcohol. They are available as neutral or acidic solutions and require very efficient cleaning systems if they are to be used effectively and safely on electronic assemblies.

Solder Selection. Most solder alloys are composed of combinations of tin and lead (see Tin and tin alloys; Lead alloys). The binary tin–lead eutectic composition is 63 at % tin and 37 at % lead, and its melting point is 183°C. For electronic assembly 60 Sn–40 Pb or 63 Sn–37 Pb solders are almost universally used. 50 Sn–50 Pb alloys are widely used in plumbing. 40 Sn–60 Pb is an inexpensive utility solder. 20 Sn–80 Pb is used as a body solder because of its large melting range. Military applications require that solders contain 0.2–0.5 at % antimony to reduce the possibility of transformation to a brittle phase at low temperatures. A number of alloys are used for special purposes. 95 Sn–5 Sb is used in refrigeration joints where tensile strength is important. Sequential soldering, in which a second joint is soldered in the vicinity of a previously soldered joint, must be accomplished with a lower melting alloy, eg, Sn–Pb–Cd or Sn–Pb–Bi, so as not to melt the first joint. Silver-fired or -coated parts are often soldered with Sn–Ag or Sn–Pb–Ag alloys to prevent the scavenging of silver by the molten alloy. These are but a few of the alloys in use. Additional alloys are described in refs. 3 and 5.

Solder alloys are made in many shapes and forms. Wire solder, in which the solder is supplied as solid or with a flux core, is used in making discrete joints. Bar solder is used in tinning pots, wiping solder pots, or wave or dip solder pots. Solder foil is used to produce stampings of special shapes, eg, washers and disks called preforms. These can be supplied with the flux on the inside (flux-filled) or on the outside (flux-coated) of the preform. Solder can be made as spheres and rings. One form of solder, which

Combinations of alcohols and chlorinated hydrocarbons, which are nonflammable and have sufficient alcohol to remove activators, are commonly used. These bipolar solvents can be used as cold cleaners sometimes with ultrasonic energy or as vapor degreasers provided they are azeotropes or near azeotropes. The toxic vapors must be controlled by proper hooding and exhausts. Another method of removal of rosin residues is an aqueous process. Rosin can be converted to a soluble ammoniated soap by treatment with hot ammoniacal solutions. Special equipment is necessary to provide the combination of mechanical and chemical action necessary to solubilize the residues.

Water-soluble organic flux residues are usually removed with water. A well-designed and -monitored cleaning system is necessary for removal of water-soluble flux residues from electronic equipment.

Additional useful information on solders and soldering is given in refs. 7–9.

Health and Safety Factors. Solder is safe to use and presents no hazard when proper working conditions prevail and workers observe safety rules. Aside from the danger of handling hot molten metal, burning oneself with a hot soldering iron, etc, the greatest danger to health lies in the presence of lead or cadmium in the solder alloy. Lead is present in large amounts in most solder alloys and some special alloys contain cadmium. The precautions used in handling lead alloys apply also to cadmium-bearing solders.

Lead is absorbed through mucous membranes of the lung, stomach, or intestines and then enters the bloodstream. Excessive amounts of lead absorption can cause anemia, fatigue, headache, weight loss, and constipation. The chief sources of lead toxicity are lead fumes, lead dust, and lead compounds ingested by eating or drinking. Lead fumes and dust can be controlled by ventilation. Air monitoring for lead content is an effective method for determining the safety of the working environment. Establishment and enforcement of rules of hygiene, eg, prohibition of eating and smoking in the work area, thorough washing of hands before eating, etc, are recommended. Periodic blood tests for lead are a recognized means of monitoring the effectiveness of the safety programs. Additional health and safety information is available from the Lead Industries Association, Inc., New York (see also Lead compounds, industrial toxicology).

Brazing Alloys

Welding, brazing, and soldering are metal-to-metal metallic bonding processes. In welding, like or similar components are fusion-bonded at or just below their melting points. In most brazing, except for the brazing of aluminum and magnesium alloys, and almost all soldering, the components, alike or dissimilar, are molecularly bonded well below their melting points. In welding, the filler metal is either puddled into relatively wide gaps or the metal surfaces being joined are partially melted and bonded by fusion or by a combination of puddling and fusion. In brazing or soldering, the filler metals are drawn into closely fitted joints by capillary attraction, and they bond and solidify without melting the components. Appreciable alloying may or may not take place during brazing, and extensive alloying is to be avoided as it may result in an unfilled joint.

5. *ASTM B32, Standard Specification for Solder Metal*, American Society for Testing and Materials, Philadelphia, Pa., 1976.
6. *Vapor Phase Reflow Soldering*, VPS, 3M Company, St. Paul, Minn.
7. H. H. Manko, *Solders and Soldering*, 2nd ed., McGraw-Hill Book Company, New York, 1979.
8. *Solders and Soldering, A Primer*, Lead Industries Association, New York, N.Y.
9. *Soldering Manual*, 2nd ed., rev., American Welding Society, Inc., Miami, Fla., 1978.
10. *Welding and Brazing*, Vol. 6 of *Metals Handbook*, 8th ed., American Society for Metals, Metals Park, Ohio, 1971, pp. 593–702.
11. *Materials and Processing Databook "81," Metals Progress*, American Society for Metals, Metals Park, Ohio, mid-June 1981, pp. 150 and 151.

GEORGE SISTARE
Consultant

FREDRICK DISQUE
Alpha Metals, Inc.

SOLVENT RECOVERY

The recovery of valuable solvents has long been regarded as an economically rewarding practice. Ever since the surge in solvent manufacturing and solvent-utilizing facilities began around 1930, processes employing solvents have generally included solvent-recovery systems as part of the initial installation. However, in some highly innovative and extremely profitable processes the inclusion of solvent recovery would have reduced the overall profitability, and solvent recovery facilities were generally added only after competition reduced profits to a normal level. There were also operations that used inexpensive solvents in quantities sufficiently small that solvent recovery could not be economically justified.

The environmental and safety hazards associated with the discharge of organic vapors and liquids to air or sewers were also recognized early with the result that even marginally profitable solvent-recovery systems were often installed to comply with industry standards or with state or local regulations. However, the establishment of the EPA in 1970 and the ensuing air- and water-pollution legislation have brought these considerations more sharply into focus (see Air pollution; Water, water pollution). The EPA now has responsibility to survey current and achievable industrial practices, and to establish limitations on the discharge of polluting emissions to air and effluents to waters. These limitations are to become more stringent in a series of steps aimed at an expressed national goal of zero pollution. For new installations the EPA is authorized to establish guidelines for pollution-reducing equipment and control systems to be used either at the end of a process or within the process (see also Regulatory agencies).

It is difficult to speculate on the ultimate impact that such far-reaching powers are likely to have on the design of solvent-recovery systems. Certainly formulation,

REFERENCE # 26

KIRK-OTHMER

ENCYCLOPEDIA OF CHEMICAL TECHNOLOGY

THIRD EDITION

VOLUME 5

CASTOR OIL
TO
CHLOROSULFURIC ACID

A WILEY-INTERSCIENCE PUBLICATION
John Wiley & Sons
NEW YORK • CHICHESTER • BRISBANE • TORONTO

Library of Congress Cataloging in Publication Data:

Main entry under title:
Encyclopedia of chemical technology.

At head of title: Kirk-Othmer.
"A Wiley-Interscience publication."
Includes bibliographies.
1. Chemistry, Technical—Dictionaries. I. Kirk, Raymond Eller, 1890–1957. II. Othmer, Donald Frederick, 1904– III. Grayson, Martin. IV. Eckroth, David. V. Title: Kirk-Othmer encyclopedia of chemical technology.

TP9.E685 1978 660'.03 77-15820
ISBN 0-471-02041-9

Printed in the United States of America

BIBLIOGRAPHY

The "Chlorocarbons and Chlorohydrocarbons Dichloroethylenes" are treated in *ECT* 1st ed. under "Chlorine Compounds, Organic", Vol. 3, pp 786–787 by Jesse Werner, General Aniline & Film Corp., Aniline Works Division; "Chlorocarbons and Chlorohydrocarbons Dichloroethylenes" in *ECT* 2nd ed. Vol. 5, pp. 178–183 by D. W. F. Hardie, Imperial Chemical Industries, Ltd.

1. M. D. Rosenzweig, *Chem. Eng.* 105, (Oct. 18, 1971).
2. Jpn. Pat. 7,330,249, (Sept. 18, 1973) H. Takenobu and co-workers, (to Central Glass Co., Ltd.).
3. G. Berens and co-workers *J. Am. Chem. Soc.* **97**, 7076 (1975).
4. M. Jones, *Tetrahedron Lett.* (53), 5593 (1968).
5. R. Ausubel, *J. Photochem.* **4**, 2418 (1975).
6. R. Ausubel, *Int. J. Chem. Kinet.* **7**, 739 (1975).
7. U.S. Pat. 3,654,358 (April 4, 1977), J. Gaines (to The Dow Chemical Company).
8. 1977 AGGIH publication, American Conference of Governments Industrial Hygienists, p. 15.
9. C. Marsden, *Solvents Guide*, 2nd ed., Interscience Publishers, New York 19B, p. 181.
10. L. Scheflan, *The Handbook of Solvents*, D. Van Nostrand Co., New York, 1953, p. 266.
11. G. Hawley, *The Condensed Chemical Dictionary*, Van Nostrand Reinhold, New York 1977, p. 279.

VIOLETE L. STEVENS
Dow Chemical Company

TRICHLOROETHYLENE

Trichloroethylene [*79-01-6*], trichloroethene, $CHCl{=}CCl_2$, is a colorless, sweet smelling, volatile liquid, and a powerful solvent for a large number of natural and synthetic substances. It is nonflammable under conditions of normal use. In the absence of stabilizers, it is slowly decomposed (autoxidized) by air. The oxidation products are acidic, and corrosive. Stabilizers are added to all commercial grades. Trichloroethylene is moderately toxic and has narcotic properties.

Trichloroethylene was first prepared by Fischer in 1864. In the early 1900s, processes were developed in Austria for the manufacture of tetrachloroethane and trichloroethylene from acetylene. Trichloroethylene manufacture began in Germany in 1920 and in the United States in 1925. Demand was stimulated by improvements in metal degreasing techniques during the 1920s and by the growth of dry-cleaning businesses during the 1930s.

The market grew steadily until 1970. Since that time trichloroethylene has come under increasing attack as an atmospheric pollutant and emissions have been severely restricted (see Air pollution).

Physical and Chemical Properties

The physical properties of trichloroethylene are listed in Table 1. Trichloroethylene is immiscible with water but miscible with many organic liquids and it is a versatile solvent. It does not have a flash or fire point. However, it does exhibit a flammable range when high concentrations of vapor are mixed with air and exposed to high-energy ignition sources (see Table 1).

Uses

Approximately 80% of the trichloroethylene produced in the United States is consumed in the vapor degreasing of fabricated metal parts (see Metal surface treatment); the remaining 20% is divided equally between exports and miscellaneous applications (22). In 1970, trichloroethylene accounted for 82% of all the chlorinated solvents used in vapor degreasing. By 1976, that share had declined to 42%. (Estimates were done by The Dow Chemical Company). A variety of miscellaneous applications include use of trichloroethylene as a component in adhesive and paint-stripping formulations, a low-temperature heat-transfer medium, a nonflammable solvent carrier in industrial paint systems, and a solvent base for metal phosphatizing systems. Trichloroethylene is used in the textile industry as a carrier solvent for spotting fluids and as a solvent in waterless preparation, dying, and finishing operations (see Dye carriers).

Trichloroethylene is widely used as a chain-transfer agent in the production of poly(vinyl chloride). An estimated 4500–6800 metric tons are consumed annually in this application (see Vinyl polymers).

BIBLIOGRAPHY

"Chlorocarbons and Chlorohydrocarbons, Trichloroethylene" treated under "Chlorine Compounds, Organic" in *ECT* 1st ed., Vol. 3, pp. 788–794 by Janet Searles and H. A. McPhail, E. I. du Pont de Nemours & Co., Inc.; "Trichloroethylene" under "Chlorocarbons and Chlorohydrocarbons" in *ECT* 2nd ed. Vol. 5, pp. 183–195, by D. W. F. Hardie, Imperial Chemical Industries Ltd.

1. L. Metz and A. Roedig, *Chem. Ing. Technick* **21**, 191 (1949).
2. U.S. Pat. 2,795,623 (June 11, 1957), F. W. Starks (to E. I. du Pont de Nemours & Co., Inc.).
3. U.S. Pat. 2,818,446 (Dec. 31, 1957), F. W. Starks (to E. I. du Pont de Nemours & Co., Inc.).
4. Brit. Pat. 794,700 (May 7, 1958), H. B. Copelin (to E. I. du Pont de Nemours & Co., Inc.).
5. R. B. Burrows and L. Hunter, *J. Chem. Soc.*, 1357 (1932).
6. B. Dobinson and G. E. Green, *Chem. Ind.*, 214 (Mar. 4, 1972).
7. A. J. Rudge, *The Manufacture and Use of Fluorine and its Compounds*, Oxford University Press (for Imperial Chemical Industries Ltd.), Cambridge, Mass., 1962, p. 71.
8. H. L. Cornish, Jr., *U.S. At. Energy Comm. TID-21388*, 1964.
9. J. Pichler and J. Rybicky, *Chem. Prum.* **16**, 559 (1966).
10. Jpn. Pat. 72 45,415 (Nov. 16, 1972), Kimimura, Takayoshi, and S. Wataru (to Hoechst Gosel Co. Ltd.).
11. U.S. Pat. 3,846,508 (Nov. 5, 1974), D. H. Heinert (to The Dow Chemical Co.).
12. U.S. Pat. 3,907,872 (Sept. 23, 1975), D. H. Heinert (to The Dow Chemical Co.).
13. Ger. Pat. 719,194 (Mar. 26, 1942), H. Kopff and C. Rautenschauch (to I.G. Farbenindustrie, A.G.).
14. Z. Jedlinski and E. Grzywa, *Polimery* **11**, 560 (1966).
15. Pol. Pat. 53,152 (Feb. 28, 1967), E. Grzywa and Z. Jedlinski (to Zaklady Chemiczne "Oswiecim").
16. S. U. Mullik and M. A. Quddus, *Pak. J. Sci. Ind. Res.* **12**(3), 181 (1970).
17. T. A. DuPlessis and A. C. Thomas, *J. Polym. Sci. Polym. Chem. Ed.* **11**, 2681 (1973).
18. R. A. Siddiqui and M. A. Quddus, *Pak. J. Sci. Ind. Res.* **14**(3), 197 (1971).
19. H. Asai, *Nippon Kagaku Zasshi* **85**, 252 (1964).
20. E. Krotki and J. Mitus, *Polimery* **9**, 155 (1964).
21. Jpn. Pat. 71 01,719 (Jan. 16, 1971), Shimokawa and Wataru (to Hekisto Gosei Co. Ltd.).
22. J. L. Blackford, "Trichloroethylene," in *Chemical Economics Handbook*, Stanford Research Institute, Menlo Park, Calif., 697.301A-697.302Y, Nov. 1975.
23. L. M. Elkin, *Process Economics Program, Chlorinated Solvents, Report No. 48*, Stanford Research Institute, Menlo Park, Calif., Feb. 1969.
24. Ger. Pat. 901,774 (Nov. 3, 1940), (to Wacker Chemie, G.m.b.H.).
25. U.S. Pat. 2,140,548 (Dec. 30, 1938), J. H. Reilly (to The Dow Chemical Co.).
26. Brit. Pat. 673,565 (June 11, 1952), (to Diamond Alkali).

27. U.S. I
28. Neth.
29. Fr. Pa
30. M. D.
31. S. Tsı
32. *Eur.* (
33. *1976*.
34. *Criter* NIOS
35. B. So
36. V. Ba
37. M. Og
38. D. M. Press
39. E. O.
40. R. D.
41. G. J.
42. R. J.
43. R. K.
44. K. Ka
45. S. M.
46. J. M.
47. *Carci* pp.
48. *TLV's* *viron*
49. B. A.

27. U.S. Pat. 2,725,412 (Nov. 29, 1955), F. Conrad (to Ethyl Chem. Co.).
28. Neth. Appl. 6,607,204 (Nov. 28, 1966), F. Sanhaber (to Donau Chemic).
29. Fr. Pat. 1,435,542 (March 7, 1966), A. C. Schulz (to Hooker Chemical).
30. M. D. Rosenzweig, *Chem. Eng.* **78**(24), 105 (Oct. 18, 1971).
31. S. Tsuda, *Chem. Eng.* **77**(10), 74 (May 4, 1970).
32. *Eur. Chem. News* **30**(769), 6 (Jan. 14, 1977).
33. *1976 Annual Book of ASTM Standards, Part 30,* ASTM, Easton, Md., 1976.
34. *Criteria Document: Recommendations for an Occupational Exposure Standard for Trichloroethylene,* NIOSH, Contract No. HSM 73-11025, Nov. 1973.
35. B. Soucek and D. Vlachove, *Br. J. Ind. Med.* **17,** 60 (1960).
36. V. Bartonicek, *Br. J. Ind. Med.* **19,** 134 (1962).
37. M. Ogata, Y. Takatsuka, and K. Tomokuni, *Br. J. Ind. Med.* **28,** 386 (1971).
38. D. M. Aviado and co-workers, *Methyl Chloroform and Trichloroethylene in the Environment,* CRC Press, Cleveland, Ohio, 1976.
39. E. O. Longley and R. Jones, *Arch. Environ. Health* **7,** 249 (1963).
40. R. D. Steward and co-workers, *Arch. Environ. Health* **20,** 64 (1970).
41. G. J. Stopps and W. McLaughlin, *Am. Ind. Hyg. Assoc. J.* **29,** 43 (1967).
42. R. J. Vernon and R. K. Ferguson, *Arch. Environ. Health* **18,** 894 (1964).
43. R. K. Ferguson and R. J. Vernon, *Arch. Environ. Health* **29,** 462 (1970).
44. K. Kadlec, *Cesk. Dermatol.* **38,** 395 (1963).
45. S. M. Peck, *J. Am. Med. Assoc.* **125,** 190 (1944).
46. J. M. Schirren, *Berufs-Dermatosen* **19,** 240 (1971).
47. *Carcinogenesis Bioassay of Trichloroethylene, NCI-CG-TR-2,* U.S. Dept. of HEW, Feb. 1976, 197 pp.
48. *TLVs® Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes for 1976,* ACGIH, Cincinnati, Ohio, 1976.
49. B. A. Schwetz, B. K. Leong, and P. J. Gehring, *Toxicol. Appl. Pharmacol.* **32,** 84 (1975).

W. C. McNeill, Jr.
Dow Chemical U.S.A.

REFERENCE # 27

DRINKING WATER REGULATIONS AND HEALTH ADVISORIES

by

Office of Drinking Water
U.S. Environmental Protection Agency
Washington, D.C.
202-382-7571

SAFE DRINKING WATER HOTLINE
1-800-426-4791 (Toll-Free)
202-382-5533 (Washington, D.C.)
Monday thru Friday, 8:30 AM to 4:30 PM EST

November 1990

LEGEND

Abbreviations column descriptions are:

MCLG - Maximum Contaminant Level Goal. A non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.

MCL - Maximum Contaminant Level. Maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

RfD - Reference Dose. An estimate of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects over a lifetime.

DWEL - Drinking Water Equivalent Level. A lifetime exposure concentration protective of adverse, non-cancer health effects, that assumes all of the exposure to a contaminant is from a drinking water source.

(*) The codes for the Status Reg and Status HA columns are as follows:

F - final
D - draft
L - listed for regulation
P - proposed (Phase II and V draft proposals)

Other codes found in the table include the following:

NA - not applicable
PS - performance standard 0.5 NTU - 1.0 NTU
TT - treatment technique

** - No more than 5% of the samples per month may be positive. For systems collecting fewer than 40 samples/month, no more than 1 sample per month may be positive.

*** - guidance

- Large discrepancies between Lifetime and Longer-term HA values may occur because of the Agency's conservative policies, especially with regard to carcinogenicity, relative source contribution, and less than lifetime exposures in chronic toxicity testing. These factors can result in a cumulative UF (uncertainty factor) of 10 to 1000 when calculating a Lifetime HA.

DRINKING WATER STANDARDS AND HEALTH ADVISORIES

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Health Advisories: Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group
ORGANICS													
Acenaphthylene	-	-	-	-	-	-	-	-	60	-	-	-	-
Acifluorfen	-	-	-	F	2000	2000	100	400	13	400	-	100	B2
Acrylamide	P	zero	TT	F	1500	300	20	70	0.2	7	-	1	B2
Acrylonitrile	L	-	-	D	20	20	1	4	0.1	4	-	7	B1
Adipates (diethylhexyl)	P	500	500	-	-	-	-	-	700	20000	500	-	C
Alachlor	P	zero	2	F	100	100	-	-	10	400	-	40	B2
Aldicarb	P	10	10*	F	-	-	-	-	1.3	40	10	-	D
Aldicarb sulfone	P	40	40*	F	-	-	-	-	6.0	200	40	-	D
Aldicarb sulfoxide	P	10	10*	F	-	-	-	-	1.3	40	10	-	D
Aldrin	-	-	-	D	0.3	0.3	0.3	0.3	0.03	1	-	0.2	B2
Ametryn	-	-	-	F	9000	9000	900	3000	9	300	60	-	D
Ammonium Sulfamate	-	-	-	F	20000	20000	20000	80000	250	8000	2000	-	D
Anthracene (PAH)	L	-	-	-	-	-	-	-	300	-	-	-	D
Atrazine	P	3	3	F	100	100	50	200	5	200	3	-	C
Baygon	-	-	-	F	40	40	40	100	4	100	3	-	C
Bentazon	-	-	-	F	300	300	300	900	2.5	90	20	-	D
Benz(a)anthracene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	B2
Benzene	F	zero	5	F	200	200	-	-	-	-	-	100	A
Benzo(a)pyrene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	B2*
Benzo(b)fluoranthene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	B2
Benzo(g,h,i)perylene (PAH)	P	-	-	-	-	-	-	-	-	-	-	-	D
Benzo(k)fluoranthene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	B2
bis-2-Chloroisopropyl ether	-	-	-	F	4000	4000	4000	13000	40	1000	300	-	-
Bromacil	-	-	-	F	5000	5000	3000	9000	130	5000	90	-	C
Bromobenzene	-	-	-	D	-	-	-	-	-	-	-	-	-

* Under review.

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Health Advisories: Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group
Bromochloroacetonitrile	L	-	-	D	-	-	-	-	-	-	-	-	-
Bromochloromethane	-	-	-	D	50000	1000	1000	5000	13	500	90	-	-
Bromodichloromethane (THM)	L	-	-	D	7000	7000	400	1300	20	600	-	30	B2
Bromoform (THM)	L	-	-	D	5000	2000	2000	6000	20	600	-	-	B2
Bromomethane	-	-	-	F	100	100	100	500	1	50	10	-	D
Butyl benzyl phthalate (PAE)	P	zero	4	-	-	-	-	-	200	-	-	-	C
Butylate	-	-	-	F	2000	2000	1000	4000	50	2000	350	-	D
Butylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene sec-	-	-	-	D	-	-	-	-	-	-	-	-	-
Butylbenzene tert-	-	-	-	D	-	-	-	-	-	-	-	-	-
Carbaryl	-	-	-	F	1000	1000	1000	1000	100	4000	700	-	D
Carbofuran	P	40	40	F	50	50	50	200	5	200	40	-	E
Carbon Tetrachloride	F	zero	5	F	4000	200	70	300	0.7	30	-	30	B2
Carboxin	-	-	-	F	1000	1000	1000	4000	100	4000	700	-	D
Chloral Hydrate	L	-	-	D	7000	1000	200	600	2	60	50	-	D
Chloramben	-	-	-	F	3000	3000	200	500	15	500	100	-	D
Chlordane	P	zero	2	F	60	60	-	-	0.06	2	-	3	B2
Chlorodibromomethane (THM)	L	-	-	D	7000	7000	2000	8000	20	800	20	-	C
Chloroethane	L	-	-	D	-	-	-	-	-	-	-	-	-
Chloroform (THM)	L	-	-	D	4000	4000	100	500	10	500	-	600	B2
Chloromethane	L	-	-	D	9000	400	400	1000	4	100	3	-	C
Chlorophenol (2-)	L	-	-	D	50	50	50	200	5	200	40	-	D
p-Chlorophenyl methyl sulfide/sulfone/sulfoxide	D	-	-	-	-	-	-	-	-	-	-	-	-
Chloropicrin	L	-	-	-	-	-	-	-	-	-	-	-	-
Chlorothalonil	-	-	-	F	200	200	200	500	15	500	-	150	B2
Chlorotoluene o-	L	-	-	F	2000	2000	2000	7000	20	700	100	-	D
Chlorotoluene p-	L	-	-	F	2000	2000	2000	7000	20	700	100	-	D
Chlorpyrifos	-	-	-	D	30	30	30	100	3	100	20	-	D
Chrysene (PAH)	-	zero	0.2	-	-	-	-	-	-	-	-	-	B2
Cyanazine	L	-	-	F	100	100	20	70	2	70	10	-	D

	Standards				Health Advisories								
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (µg/l)	MCL (µg/l)	Status HA*	One-day µg/l	Ten-day µg/l	Longer-term µg/l	Longer-term µg/l	RfD µg/kg/day	DWEL µg/l	Lifetime µg/l	µg/l at 10^{-4} Cancer Risk	Cancer Group
Cyanogen Chloride	L	-	-	-	-	-	-	-	-	-	-	-	-
Cymene p-	-	-	-	D	-	-	-	-	-	-	-	-	-
2,4-D	P	70	70	F	1000	300	100	400	10	400	70	-	D
DCPA (Dacthal)	-	-	-	F	80000	80000	5000	20000	500	20000	4000	-	D
Dalapon	P	200	200	F	3000	3000	300	900	26	900	200	-	D
Dichloroethylene (cis-1,2-)	P	70	70	F	4000	1000	3500	11000	10	400	70	-	D
Dichloroethylene (trans-1,2-)	P	100	100	F	20000	2000	2000	6000	20	600	100	-	D
Dichlorophenol (2,4-)	L	-	-	D	30	30	30	100	3	100	20	-	D
Diazinon	-	-	-	F	20	20	5	20	0.09	3	0.6	-	E
Dibenz(a,h)anthracene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	B2
Dibromoacetonitrile	L	-	-	D	2000	2000	2000	8000	20	800	20	-	C
Dibromochloropropane (DBCP)	P	zero	0.2	F	200	50	-	-	-	-	-	3	B2
Dibromomethane	L	-	-	-	-	-	-	-	-	-	-	-	D
Dibutyl phthalate (PAE)	P	zero	4	-	-	-	-	-	100	-	-	-	D
Dicamba	L	-	-	F	300	300	300	1000	30	1000	200	-	D
Dichloroacetaldehyde	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroacetic acid	L	-	-	D	50000	50000	500	2000	5	200	3	-	C
Dichloroacetonitrile	L	-	-	D	1000	1000	800	3000	8	300	6	-	C
Dichlorobenzene p-	F	75	75	F	10000	10000	10000	40000	100	4000	75	-	C
Dichlorobenzene o-,m-	P	600	600	F	9000	9000	9000	30000	89	3000	600	-	D
Dichlorodifluoromethane	-	-	-	F	40000	40000	9000	30000	200	5000	1000	-	D
Dichloroethane (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloroethane (1,2-)	F	zero	5	F	700	700	700	2600	-	-	-	40	B2
Dichloroethylene (1,1-)	F	7	7	F	2000	1000	1000	4000	9	400	7	-	C
Dichloromethane	P	zero	5	F	10000	2000	-	-	60	2000	-	500	B2
Dichloropropane (1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropane (1,2-)	P	zero	5	F	-	-	-	-	-	-	-	50	B2
Dichloropropane (1,3-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropane (2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Dichloropropene (1,1-)	L	-	-	D	-	-	-	-	-	-	-	-	-

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Health Advisories: Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group
Dichloropropene (1,3-)	L	-	-	F	30	30	30	100	0.3	10	-	20	B2
Dieldrin	L	-	-	F	0.5	0.5	0.5	2	0.05	2	-	0.2	B2
Diethyl phthalate (PAE)	P	zero	4	D	-	-	-	-	800	-	-	-	D
Diethylhexyl phthalate (PAE	P	zero	4	D	-	-	-	-	20	-	-	300	B2*
Diisopropyl methylphosphonate	-	-	-	F	8000	8000	8000	30000	80	3000	600	-	D
Dimethrin	-	-	-	F	10000	10000	10000	40000	300	10000	2000	-	D
Dimethyl methylphosphonate	-	-	-	D	-	-	-	-	-	-	-	-	-
Dimethyl phthlate (PAE	P	zero	4	-	-	-	-	-	-	-	-	-	D
1,3-Dinitrobenzene	-	-	-	D	40	40	40	140	0.1	5	1	-	D
Dinitrotoluene (2,4-)	L	-	-	D	-	-	-	-	-	-	-	-	-
2,4-/2,6-Dinitrotoluene	-	-	-	D	-	-	-	-	-	-	-	-	-
Dinoseb	P	7	7	F	300	300	10	40	1	40	7	-	D
Dioxane p-	-	-	-	F	4000	400	-	-	-	-	-	700	B2
Diphenamid	-	-	-	F	300	300	300	1000	30	1000	200	-	D
Diquat	P	20	20	-	-	-	-	-	2.2	-	-	-	D
Disulfoton	-	-	-	F	10	10	3	9	0.04	1	0.3	-	E
1,4-Dithiane	-	-	-	D	-	-	-	-	-	-	-	-	-
Diuron	-	-	-	F	1000	1000	300	900	2	70	10	-	D
Endothall	P	100	100	F	800	800	200	200	20	700	100	-	D
Endrin	P	2	2	F	20	20	3	10	3	9	2	-	D
Epichlorohydrin	P	zero	TT	F	100	100	70	70	2	70	-	400	B2
Ethylbenzene	P	700	700	F	30000	3000	1000	3000	100	3000	700	-	D
Ethylene dibromide (EDB)	P	zero	0.05	F	8	8	-	-	-	-	-	0.04	B2
Ethylene glycol	-	-	-	F	20000	6000	6000	20000	2000	40000	7000	-	D
ETU	L	-	-	F	300	300	100	400	0.03	1	-	6	B2
Fenamiphos	-	-	-	F	9	9	5	20	0.25	9	2	-	D
Fluometuron	-	-	-	F	2000	2000	2000	5000	13	400	90	-	D
Fluorene (PAH)	P	zero	0.2	-	-	-	-	-	40	-	-	-	D
Fluorotrichloromethane	-	-	-	F	7000	7000	3000	10000	300	10000	2000	-	D
Fog Oil	-	-	-	D	-	-	-	-	-	-	-	-	-

	Standards			Health Advisories									
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (µg/l)	MCL (µg/l)	Status HA*	One-day µg/l	Ten-day µg/l	Longer-term µg/l	Longer-term µg/l	RfD µg/kg/day	DWEL µg/l	Lifetime µg/l	µg/l at 10^{-4} Cancer Risk	Cancer Group
Fonofos	-	-	-	F	20	20	20	70	2	70	10	-	D
Formaldehyde	-	-	-	D	10000	5000	5000	20000	150	5000	1000	-	B1-Inhal
Gasoline	-	-	-	D	-	-	-	-	-	-	5(benzene)	-	-
Glyphosate	P	700	700	F	20000	20000	1000	1000	100	4000	700	-	D
Heptachlor	P	zero	0.4	F	10	10	5	5	0.5	20	-	0.8	B2
Heptachlor epoxide	P	zero	0.2	F	10	-	0.1	0.1	0.013	0.4	-	0.4	B2
Hexachlorobenzene	P	zero	1	F	50	50	50	200	0.8	30	-	2	B2
Hexachlorobutadiene	-	-	-	F	300	300	100	400	2	70	1	-	C
Hexachlorocyclopentadiene	P	50	50	-	-	-	-	-	7	200	-	-	D
Hexachloroethane	-	-	-	D	5000	5000	100	500	1	40	1	-	C
Hexane (n-)	-	-	-	F	10000	4000	4000	10000	-	-	-	-	D
Hexazinone	-	-	-	F	3000	3000	3000	9000	30	1000	200	-	D
HMX	-	-	-	F	5000	5000	5000	20000	50	2000	400	-	D
Hypochlorite	L	-	-	-	-	-	-	-	-	-	-	-	-
Hypochlorous acid	L	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3,-c,d)pyrene (PAH)	P	zero	0.2	D	-	-	-	-	-	-	-	-	B2
Isophorone	L	-	-	D	15000	15000	15000	15000	200	7000	100	-	C
Isopropyl methylphosphonate	-	-	-	-	-	-	-	-	-	-	-	-	-
Isopropylbenzene	-	-	-	D	-	-	-	-	-	-	-	-	-
Lindane	P	0.2	0.2	F	1000	1000	30	100	0.3	10	0.2	-	C
Malathion	-	-	-	D	200	200	200	800	20	800	200	-	D
Maleic hydrazide	-	-	-	F	10000	10000	5000	20000	500	20000	4000	-	D
MCPA	-	-	-	F	100	100	100	400	1.5	53	11	-	E
Methomyl	-	-	-	F	300	300	300	300	25	900	200	-	D
Methoxychlor	P	400	400	F	6000	2000	500	2000	50	2000	400	-	D
Methyl ethyl ketone	-	-	-	F	80000	8000	3000	9000	25	900	200	-	D
Methyl parathion	-	-	-	F	300	300	30	100	0.25	9	2	-	D
Methyl tert butyl ether	L	-	-	D	3000	3000	500	2000	5	200	40	-	D
Metolachlor	L	-	-	F	2000	2000	2000	5000	150	5000	100	-	C
Metribuzin	L	-	-	F	5000	5000	300	900	25	900	200	-	D

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Health Advisories: Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group
Monochloroacetic acid	L	-	-	D	-	-	-	-	-	-	-	-	-
Monochlorobenzene	P	100	100	F	2000	2000	2000	7000	20	700	100	-	D
Naphthalene	-	-	-	D	500	500	400	1000	4	100	20	-	D
Nitrocellulose (non-toxic)	-	-	-	F	-	-	-	-	-	-	-	-	-
Nitroguanidine	-	-	-	F	10000	10000	10000	40000	100	4000	700	-	D
Nitrophenols p-	-	-	-	D	800	800	800	3000	8	300	60	-	D
Oxamyl (Vydate)	P	200	200	F	200	200	200	900	25	900	200	-	E
Ozone by-products	L	-	-	-	-	-	-	-	-	-	-	-	-
Paraquat	-	-	-	F	100	100	50	200	4.5	200	30	-	E
Pentachloroethane	-	-	-	D	-	-	-	-	-	-	-	-	-
Pentachlorophenol	P	200/zero	200/0.1*	F	1000	300	300	1000	30	1000	-	30	B2
Phenanthrene (PAH)	P	zero	0.2	-	-	-	-	-	-	-	-	-	-
Phenol	-	-	-	D	6000	6000	6000	20000	600	20000	4000	-	D
Picloram	P	500	500	F	20000	20000	700	2000	70	2000	500	-	D
Polychlorinated byphenyls (PCBs)	P	zero	0.5	P	-	-	-	-	-	-	-	0.5	B2
Prometon	-	-	-	F	200	200	200	500	15	500	100	-	D
Pronamide	-	-	-	F	800	800	800	3000	75	3000	50	-	C
Propachlor	-	-	-	F	500	500	100	500	13	500	90	-	D
Propazine	-	-	-	F	1000	1000	500	2000	20	700	10	-	C
Propham	-	-	-	F	5000	5000	5000	20000	20	600	100	-	D
Propylbenzene n-	-	-	-	D	-	-	-	-	-	-	-	-	-
Pyrene (PAH)	P	zero	0.2	-	-	-	-	-	30	-	-	-	D
RDX	-	-	-	F	100	100	100	400	3	100	2	30	C
Simazine	P	1	1	F	500	500	50	200	2	60	1	-	C
Styrene	P	zero/100	5/100*	F	20000	2000	2000	7000	200	7000	0/100	1	B2/C
2,4,5-T	L	-	-	F	800	800	800	1000	10	350	70	-	D
2,3,7,8-TCDD (Dioxin)	P	zero	5×10^{-8}mg/L	F	0.0011	E-04	1E-05	4E-05	1E-06	4E-05	-	2E-05	B2
Tebuthiuron	-	-	-	F	3000	3000	700	2000	70	2000	500	-	D
Terbacil	-	-	-	F	300	300	300	900	13	400	90	-	E
Terbufos	-	-	-	F	5	5	1	5	0.13	5	0.9	-	D

* Under review.

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group *
Tetrachloroethane (1,1,1,2-)	L	-	-	F	2000	2000	900	3000	30	1000	70	100	C
Tetrachloroethane (1,1,2,2-)	L	-	-	D	-	-	-	-	-	-	-	-	-
Tetrachloroethylene	P	zero	5	F	2000	2000	1000	5000	10	500	-	70	B2
Toluene	P	2000	2000*	F	20000	3000	3000	10000	100	5	1000	-	D
Toxaphene	P	zero	5*	F	500	40	-	-	100	3.5	-	3	B2
2,4,5-TP	P	50	50	F	200	200	70	300	7.5	300	50	-	D
1,1,2-Trichloro-1,2,2-trifluoroethane	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroacetic acid	L	-	-	D	30000	30000	30000	100000	300	10000	200	-	C
Trichloroactonitrile	L	-	-	D	50	50	-	-	-	-	-	-	-
Trichlorobenzene (1,2,4-)	P	9	9	F	100	100	100	500	1	50	9	-	D
Trichlorobenzene (1,3,5-)	-	-	-	F	600	600	600	2000	6	200	40	-	D
Trichloroethane (1,1,1-)	F	200	200	F	100000	40000	40000	100000	35	1000	200	-	D
Trichloroethane (1,1,2-)	P	3	5	F	600	400	400	1000	4	100	3	-	C
Trichloroethanol (2,2,2-)	L	-	-	-	-	-	-	-	-	-	-	-	-
Trichloroethylene	F	zero	5	F	-	-	-	-	7	300	-	300	B2
Trichlorophenol (2,4,6-)	L	-	-	D	-	-	-	-	-	-	-	300	B2
Trichloropropane (1,1,1-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trichloropropane (1,2,3-)	-	-	-	F	600	600	600	2000	6	200	40	-	-
Trifluralin	L	-	-	F	80	80	80	300	7.5	300	5	-	C
Trimethylbenzene (1,2,4-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trimethylbenzene (1,3,5-)	-	-	-	D	-	-	-	-	-	-	-	-	-
Trinitroglycerol	-	-	-	F	5	5	5	5	-	-	5	-	-
Trinitrotoluene	-	-	-	F	20	20	20	20	0.5	20	2	-	C
Vinyl chloride	F	zero	2	F	3000	3000	10	50	-	-	-	1.5	A
White phosphorus	-	-	-	D	-	-	-	-	0.02	0.5	0.1	-	-
Xylenes	P	10000	10000	F	40000	40000	40000	100000	2000	60000	10000	-	D
Zinc chloride	-	-	-	D	-	-	-	-	-	-	-	-	-

* Under review.

MICROBIOLOGY

	Status	MCLG	MCL
Cryptosporidium	L	-	-
Giardia lamblia	F	zero	TT
Legionella	F*	zero	TT
Standard Plate Count	F*	NA	TT
Total Coliforms (Current)	F	NA	varies
Total Coliforms (after 12/31/90)	F	zero	**
Turbidity (before 1/1/91)	F	NA	1 and 5 NTU
Turbidity (after 12/31/90)	F	NA	PS
Viruses	F*	zero	TT

Key: PS, TT, F, defined as previously stated.

*: Final for systems using surface water; also being considered for regulation under groundwater disinfection rule.

Varies: MCL varies based on analytical method used, sample volume, and number of samples collected per month. Also, two types of MCLs = the monthly average and the "single sample" MCL. Both are based on coliform density.

"1 and 5 NTU": These are two MCLs for turbidity. The monthly average MCL is 1 NTU; the two-day consecutive average MCL is 5 NTU.

SECONDARY MAXIMUM CONTAMINANT LEVELS

Chemicals	Status*	SMCLs (mg/l)
Aluminum	P	0.05 to 0.2
Chloride	F	250
Color	F	15 color units
Copper	F	1
Corrosivity	F	non-corrosive
Dichlorobenzene -o	P	0.01
Dichlorobenzene -p	P	0.005
Ethylbenzene	P	0.03
Fluoride	F	2
Foaming Agents	F	0.5
Hexachlorocyclopentadiene		0.008
Iron	F	0.3
Manganese	F	0.05
Odor	F	3 threshold odor numbers
Pentachlorophenol	P	0.03
pH	F	6.5 - 8.5
Silver	P	0.09
Sulfate	F	250
Toluene	P	0.04
Total Dissolved Solids (TD)	F	500
Xylene	P	0.02
Zinc	F	5

* Status Codes: P - proposed, F - final

	Standards			Health Advisories									
					10-kg Child			70-kg Adult					
Chemicals	Status Reg.*	MCLG (µg/l)	MCL (µg/l)	Status HA*	One-day µg/l	Ten-day µg/l	Longer-term µg/l	Longer-term µg/l	RfD µg/kg/day	DWEL µg/l	Lifetime µg/l	µg/l at 10^{-4} Cancer Risk	Cancer Group
Nitrite (as N)	P	1000	1000	F	-	1000	-	-	1600	-	-	-	D
Nitrate + Nitrite	P	10000	10000	-	-	-	-	-	-	-	-	-	-
Selenium	P	50	50	-	-	-	-	-	-	-	-	-	-
Silver	L	-	-	D	200	200	200	200	5	200	100	-	D
Sodium	L	-	-	D	-	-	-	-	-	20000***	-	-	-
Strontium	L	-	-	D	25000	25000	25000	90000	2500	90000	17000	-	D
Sulfate	P	400000/ 500000	400000/ 500000	-	-	-	-	-	-	-	-	-	-
Thallium	P	0.5	2/1	D	7	7	7	20	0.07	2	0.4	-	-
Vanadium	L	-	-	D	80	80	30	100	3	100	20	-	D
Zinc	L	-	-	D	4000	4000	4000	4000	100	4000	4000	-	D
RADIONUCLIDES													
Beta particle and photon activity (formerly man-made radionuclides)	F	zero	4 mrem	-	-	-	-	-	-	-	-	4 mrem/y	A
Gross alpha particle activity	F	zero	15 pCi/L	-	-	-	-	-	-	-	-	-	A
Radium 226/228	F	zero	5 pCi/L	-	-	-	-	-	-	-	-	21/28 pCi/l	A
Radon	T	zero	-	-	-	-	-	-	-	-	-	160 pCi/l	A
Uranium	T	zero	-	-	-	-	-	-	-	-	-	26 pCi/l	A

Chemicals	Standards: Status Reg.*	Standards: MCLG (µg/l)	Standards: MCL (µg/l)	Health Advisories: Status HA*	10-kg Child: One-day µg/l	10-kg Child: Ten-day µg/l	10-kg Child: Longer-term µg/l	70-kg Adult: Longer-term µg/l	70-kg Adult: RfD µg/kg/day	70-kg Adult: DWEL µg/l	70-kg Adult: Lifetime µg/l	70-kg Adult: µg/l at 10^{-4} Cancer Risk	Cancer Group
INORGANICS													
Aluminum	L	-	-	D	-	-	-	-	-	-	-	-	-
Ammonia	L	-	-	D	-	-	-	-	-	-	30000	-	D
Antimony	P	3	10/5	D	15	15	15	15	0.4	15	3	-	D
Arsenic	P	zero	-	D	-	-	-	-	1	-	-	3	A
Asbestos (fibers/l > 10um)	P	7E+06	7E+06	-	-	-	-	-	-	-	-	-	-
Barium	P	5000	5000*	F	-	-	-	-	70	-	2000	-	D
Beryllium	P	zero	1	D	30000	30000	4000	20000	5	200	-	0.8	B2
Boron	L	-	-	D	4000	900	900	3000	90	3000	600	-	D
Cadmium	P	5	5	F	40	40	5	20	0.5	20	5	-	D
Chloramine	L	-	-	D	1000	1000	1000	4000	10	400	300	-	D
Chlorate	L	-	-	D	40	40	40	100	0.4	10	10	-	D
Chlorine	L	-	-	D	3000	3000	400	2000	40	2000	1000	-	D
Chlorine dioxide	L	-	-	D	300	300	300	1000	3	100	80	-	D
Chlorite	L	-	-	D	100	100	400	400	1	40	30	-	-
Chromium (total)	P	100	100	F	1000	1000	200	800	5	200	100	-	D
Copper	P	1300	1300	-	-	-	-	-	-	-	-	-	D
Cyanide	P	200	200	F	200	200	200	800	22	800	200	-	D
Fluoride	F	4000	4000	-	-	-	-	-	60	-	-	-	-
Lead (at source)	P	zero	5*	-	-	-	-	-	-	-	-	-	B2
Lead (at tap)	P	zero	TT*	-	-	-	-	-	-	-	-	-	B2
Manganese	-	-	-	D	-	-	-	-	140	-	-	-	-
Mercury	P	2	2	F	-	-	-	2	0.3	10	2	-	D
Molybdenum	L	-	-	D	80	80	10	50	1	50	50	-	D
Nickel	P	100	100	F	1000	1000	100	600	20	600	100	-	D
Nitrate (as N)	P	10000	10000	F	-	10000	-	-	1600	-	-	-	D

* Under review.

NUS CORPORATION AND SUBSIDIARI.

TELECON NOTE

REFERENCE # 28

CONTROL NO.	DATE: July 15, 1991	TIME: 3:40 p.m.

DISTRIBUTION: General

BETWEEN: Glenn Adams	OF: Groundwater Technology Unit USEPA, Region IV, Atlanta, GA	PHONE: (404) 347-3866

AND: Joan Dupont, Halliburton NUS Corporation

Joan Dupont 7/15/91

DISCUSSION:

I asked Glenn Adams about the current Federal standard for lead in drinking water. According to the June 7, 1991 Federal Register, the current standard is an action level of 15 ug/l for lead. This action level applies to public water systems (PWS). These PWS are required to sample the water at a certain number of residences, collecting a 1 liter, first-draw sample at the tap. If a certain percentage of these residences have ≥ 15ug/l of lead in their drinking water, the PWS is required to adjust its treatment for corrosivity.

For Superfund purposes, the old Maximum Contaminant Level (MCL) of 50 ug/l for lead is no longer applicable. However, since it takes time for PWS to implemented the new standard, they are being allowed to use the MCL for lead, sampled at the tap, until about October 1992.

Emergency action standards for lead in PWS, indicating an imminent hazard, will go into effect soon. These standards, called Unreasonable Risk to Health (URTH), will be 20 ppb (ug/l) for children and 30 ppb for adults, based upon a 0.25 liter, first-draw water sample at the tap.

McAdams

FLD11AG24188
NAUTELL
FT LAUDERDALE
BROWARD

SITE [redacted] (FIT) STATE [redacted] MANAGER ROGER FRANKLIN (NUS)
PROJECT # 91-369 SHIPWEEK 03/18/91

SOILVOA BOOKED	12	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OVOA BOOKED	6	DATA RECEIVED	/ /	FOR	0	SAMPLES
SOILEXT BOOKED	11	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OEXT BOOKED	6	DATA RECEIVED	/ /	FOR	0	SAMPLES
SOILPEST BOOKED	11	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OPEST BOOKED	6	DATA RECEIVED	/ /	FOR	0	SAMPLES
SOILMET BOOKED	11	DATA RECEIVED	05/20/91	FOR	6	SAMPLES
H2OMET BOOKED	6	DATA RECEIVED	05/20/91	FOR	3	SAMPLES
SOILCN BOOKED	11	DATA RECEIVED	05/20/91	FOR	6	SAMPLES
H2OCN BOOKED	6	DATA RECEIVED	05/20/91	FOR	3	SAMPLES
SOILOTH1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
SOILOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OOTH1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
OTHER1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
OTHER2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES

LAB(CLP/ESD) CLP

REMARKS

RECEIVED
MAY 21 1991
EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/11/91

SUBJECT: Results of Metals Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

CC:

INORGANIC DATA QUALIFIERS REPORT

Case Number: 16059
Project Number: 91-369
Site: Navtell, Ft. Lauderdale, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in Blanks
Al	J	All positives	Matrix spike recovery = 133%
Hg	J R	All positives All negatives	Matrix spike recovery = 170% Blind spike recovery = 0%
Se	J	All	Matrix spike recovery = 30.1% Calibration curve r <.995
B. Soil			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Ni, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in blanks
Hg	J R	All positives All negatives	Matrix spike recovery = 155.8% Blind spike recovery = 0%
Se	J	All	Calibration curve r <.995

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56288 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: PB-01 COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
130UJ	ALUMINUM	8U	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
2U	ARSENIC	5U	NICKEL
4U	BARIUM	3000	POTASSIUM
1U	BERYLLIUM	3UJ	SELENIUM
2U	CADMIUM	3U	SILVER
21000	CALCIUM	39000	SODIUM
5U	CHROMIUM	2UJ	THALLIUM
3U	COBALT	NA	TIN
2U	COPPER	3U	VANADIUM
53	IRON	6U	ZINC
6	LEAD		
6000	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00 **
** CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM30 **
**
*** ***

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1400	ALUMINUM	11	MANGANESE
2.6U	ANTIMONY	0.11UR	MERCURY
1U	ARSENIC	2U	NICKEL
7.2	BARIUM	57	POTASSIUM
0.22U	BERYLLIUM	0.65UJ	SELENIUM
0.43U	CADMIUM	0.65U	SILVER
150000	CALCIUM	350U	SODIUM
3.9	CHROMIUM	0.43U	THALLIUM
0.65U	COBALT	NA	TIN
2U	COPPER	4.9	VANADIUM
780	IRON	5U	ZINC
2	LEAD	11	PERCENT MOISTURE
700	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-01 COLLECTION START: 03/20/91 1145 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM31

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1200	ALUMINUM	3.2	MANGANESE
2.6U	ANTIMONY	0.09UR	MERCURY
1U	ARSENIC	2U	NICKEL
3.1	BARIUM	30U	POTASSIUM
0.21U	BERYLLIUM	0.64UJ	SELENIUM
0.43U	CADMIUM	0.64U	SILVER
66000	CALCIUM	130U	SODIUM
4.2	CHROMIUM	0.43U	THALLIUM
0.64U	COBALT	NA	TIN
1U	COPPER	1.9	VANADIUM
660	IRON	4U	ZINC
2.4	LEAD	09	PERCENT MOISTURE
240	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-02 COLLECTION START: 03/20/91 1015 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM32

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1700	ALUMINUM	11	MANGANESE
3U	ANTIMONY	0.13UR	MERCURY
2U	ARSENIC	1.2U	NICKEL
11	BARIUM	79	POTASSIUM
0.25U	BERYLLIUM	0.72UJ	SELENIUM
0.50U	CADMIUM	0.74U	SILVER
75000	CALCIUM	180U	SODIUM
7.6	CHROMIUM	0.48U	THALLIUM
0.74U	COBALT	NA	TIN
4U	COPPER	2.3	VANADIUM
390	IRON	10U	ZINC
3.9	LEAD	20	PERCENT MOISTURE
250	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM33

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1400	ALUMINUM	8.4	MANGANESE
2.7U	ANTIMONY	0.10UR	MERCURY
0.45U	ARSENIC	2U	NICKEL
6.4	BARIUM	28U	POTASSIUM
0.23U	BERYLLIUM	0.67UJ	SELENIUM
0.45U	CADMIUM	0.68U	SILVER
140000	CALCIUM	280U	SODIUM
4.6	CHROMIUM	0.45U	THALLIUM
2U	COBALT	NA	TIN
2U	COPPER	2.5	VANADIUM
800	IRON	9U	ZINC
3.5	LEAD	12	PERCENT MOISTURE
580	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

METALS DATA REPORT 05/10/91

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM35

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1200	ALUMINUM	18	MANGANESE
3.3U	ANTIMONY	0.14UR	MERCURY
2U	ARSENIC	1.4U	NICKEL
8.8	BARIUM	70	POTASSIUM
0.27U	BERYLLIUM	1UJ	SELENIUM
0.55U	CADMIUM	0.82U	SILVER
86000	CALCIUM	210U	SODIUM
3.2	CHROMIUM	0.58U	THALLIUM
2U	COBALT	NA	TIN
7U	COPPER	2.7	VANADIUM
1800	IRON	20U	ZINC
8.9	LEAD	30	PERCENT MOISTURE
420	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SB-03 COLLECTION START: 03/20/91 1405 STOP: 00/00/00 **
** CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM36 **
** **
*** ***

MG/KG	ANALYTICAL RESULTS	MG/KG	ANALYTICAL RESULTS
1800	ALUMINUM	4.7	MANGANESE
2.6U	ANTIMONY	0.09UR	MERCURY
0.45U	ARSENIC	1.1U	NICKEL
4.2	BARIUM	62	POTASSIUM
0.22U	BERYLLIUM	0.68UJ	SELENIUM
0.44U	CADMIUM	0.65U	SILVER
70000	CALCIUM	140U	SODIUM
5.2	CHROMIUM	0.45U	THALLIUM
0.65U	COBALT	NA	TIN
0.44U	COPPER	2.3	VANADIUM
1000	IRON	5U	ZINC
3.3	LEAD	12	PERCENT MOISTURE
250	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
5900J	ALUMINUM	30	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
3U	ARSENIC	9U	NICKEL
120	BARIUM	3600	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
11	CADMIUM	3U	SILVER
2100000	CALCIUM	41000	SODIUM
26	CHROMIUM	2UJ	THALLIUM
3U	COBALT	NA	TIN
6U	COPPER	19	VANADIUM
5800	IRON	40U	ZINC
13	LEAD		
6000	MAGNESIUM		

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

METALS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: MD NUMBER: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
17000J	ALUMINUM	83	MANGANESE
12U	ANTIMONY	0.20UR	MERCURY
40	ARSENIC	10	NICKEL
150	BARIUM	6400	POTASSIUM
1U	BERYLLIUM	15UJ	SELENIUM
2U	CADMIUM	3U	SILVER
2200000	CALCIUM	53000	SODIUM
55	CHROMIUM	2UJ	THALLIUM
5U	COBALT	NA	TIN
20U	COPPER	26	VANADIUM
16000	IRON	60U	ZINC
25	LEAD		
7800	MAGNESIUM		

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/11/91

SUBJECT: Results of Specified Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

INORGANIC DATA QUALIFIERS REPORT

Case Number: 16059
Project Number: 91-369
Site: Navtell, Ft. Lauderdale, FL

Element	Flag	Samples Affected	Reason
A. Water			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in Blanks
Al	J	All positives	Matrix spike recovery = 133%
Hg	J	All positives	Matrix spike recovery = 170%
	R	All negatives	Blind spike recovery = 0%
Se	J	All	Matrix spike recovery = 30.1% Calibration curve r <.995
B. Soil			
As, Cd, Cu, Pb	U	All positives >IDL but <CRDL	Baseline instability
Al, Ca, Ni, Na, Zn	U	All positives >IDL but <10X contaminant level	Positives in blanks
Hg	J	All positives	Matrix spike recovery = 155.8%
	R	All negatives	Blind spike recovery = 0%
Se	J	All	Calibration curve r <.995

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56288 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: PB-01 COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: MD NO: AM29

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-01
CASE.NO.: 16059 SAS NO.:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1035 STOP: 00/00/00
D. NO.: AM30 MD NO: AM30

RESULTS	UNITS	PARAMETER
5.5U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56290  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN               **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD              ST: FL                  **
**   STATION ID: SB-01                                                COLLECTION START: 03/20/91  1145   STOP: 00/00/00     **
**   CASE.NO.: 16059          SAS NO.:                                D. NO.: AM31                MD NO: AM31               **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
4.8U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD. ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369   SAMPLE NO. 56291   SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                 **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD             ST: FL                    **
**   STATION ID: SS-02                                                COLLECTION START: 03/20/91  1015   STOP: 00/00/00      **
**   CASE.NO.: 16059          SAS NO.:                                D. NO.: AM32                 MD NO: AM32               **
**                                                                                                                           **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
5.9U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56292  SAMPLE TYPE: SOIL       PROG ELEM: NSF   COLLECTED BY: M COHEN            **
**   SOURCE: NAVTELL                                                 CITY: FT LAUDERD             ST: FL               **
**   STATION ID: SB-02                                               COLLECTION START: 03/20/91  1255  STOP: 00/00/00  **
**   CASE.NO.: 16059          SAS NO.:                               D. NO.: AM33                MD NO: AM33           **
**                                                                                                                     **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
5.3U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: AM35 MD NO: AM35

RESULTS	UNITS	PARAMETER
6.9U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SB-03 COLLECTION START: 03/20/91 1405 STOP: 00/00/00 **
** CASE.NO.: 16059 SAS NO.: D. NO.: AM36 MD NO: AM36 **
** **
*** ***

RESULTS	UNITS	PARAMETER
5.6U	MG/KG	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SPECIFIED ANALYSIS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.: D. NO.: AM34 MD NO: AM34

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/10/91

SPECIFIED ANALYSIS DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56300  SAMPLE TYPE: GROUNDWA    PROG ELEM: NSF   COLLECTED BY: M COHEN                 **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD                ST: FL                   **
**   STATION ID: MW-02                                                COLLECTION START: 03/20/91  1435   STOP: 00/00/00       **
**   CASE.NO.: 16059            SAS NO.:                              D. NO.: AM37                 MD NO: AM37                **
**                                                                                                                            **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

RESULTS	UNITS	PARAMETER
10U	UG/L	CYANIDE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.

FLD 11 PG 24 / A8

SITE **NAVTELL** (FIT) STATE FL MANAGER ROGER FRANKLIN (NUS)
PROJECT # 91-369 SHIPWEEK 03/18/91

SOILVOA BOOKED	12	DATA RECEIVED	06/04/91	FOR	7	SAMPLES
H2OVOA BOOKED	6	DATA RECEIVED	06/04/91	FOR	3	SAMPLES
SOILEXT BOOKED	11	DATA RECEIVED	06/04/91	FOR	6	SAMPLES
H2OEXT BOOKED	6	DATA RECEIVED	06/04/91	FOR	3	SAMPLES
SOILPEST BOOKED	11	DATA RECEIVED	06/04/91	FOR	6	SAMPLES
H2OPEST BOOKED	6	DATA RECEIVED	06/04/91	FOR	3	SAMPLES
SOILMET BOOKED	11	DATA RECEIVED	05/20/91	FOR	6	SAMPLES
H2OMET BOOKED	6	DATA RECEIVED	05/20/91	FOR	3	SAMPLES
SOILCN BOOKED	11	DATA RECEIVED	05/20/91	FOR	6	SAMPLES
H2OCN BOOKED	6	DATA RECEIVED	05/20/91	FOR	3	SAMPLES
SOILOTH1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
SOILOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OOTH1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
H2OOTH2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
OTHER1 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES
OTHER2 BOOKED	0	DATA RECEIVED	/ /	FOR	0	SAMPLES

LAB (CLP/ESD) CLP

REMARKS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Purgeable Organic Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

cc:

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00 **
** **
** CASE NO.: 16059 SAS NO.: D. NO.: AM30 **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
9U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
9U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
9U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
9U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
9U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
9U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	9U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	9U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
9U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES
		9	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SB-01 COLLECTION START: 03/20/91 1145 STOP: 00/00/00 **
**
** CASE NO.: 16059 SAS NO.: D. NO.: AM31 **
*** ***

UG/KG	ANALYTICAL RESULTS
10U	CHLOROMETHANE
10U	BROMOMETHANE
10U	VINYL CHLORIDE
10U	CHLOROETHANE
30U	METHYLENE CHLORIDE
40U	ACETONE
5U	CARBON DISULFIDE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
5U	1,1-DICHLOROETHANE
5U	1,2-DICHLOROETHENE (TOTAL)
5U	CHLOROFORM
5U	1,2-DICHLOROETHANE
10U	METHYL ETHYL KETONE
5U	1,1,1-TRICHLOROETHANE
5U	CARBON TETRACHLORIDE
5U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
5U	1,2-DICHLOROPROPANE
5U	CIS-1,3-DICHLOROPROPENE
5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
5U	DIBROMOCHLOROMETHANE
5U	1,1,2-TRICHLOROETHANE
5U	BENZENE
5U	TRANS-1,3-DICHLOROPROPENE
5U	BROMOFORM
10U	METHYL ISOBUTYL KETONE
10U	METHYL BUTYL KETONE
5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,1,2,2-TETRACHLOROETHANE
5U	TOLUENE
5U	CHLOROBENZENE
5U	ETHYL BENZENE
5U	STYRENE
5U	TOTAL XYLENES
9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

PURGEABLE ORGANICS DATA REPORT 05/23/91

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-02 COLLECTION START: 03/20/91 1015 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM32

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
12U	CHLOROMETHANE	6U	1,2-DICHLOROPROPANE
12U	BROMOMETHANE	6U	CIS-1,3-DICHLOROPROPENE
12U	VINYL CHLORIDE	6U	TRICHLOROETHENE(TRICHLOROETHYLENE)
12U	CHLOROETHANE	6U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	6U	1,1,2-TRICHLOROETHANE
20U	ACETONE	6U	BENZENE
6U	CARBON DISULFIDE	6U	TRANS-1,3-DICHLOROPROPENE
6U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	6U	BROMOFORM
6U	1,1-DICHLOROETHANE	12U	METHYL ISOBUTYL KETONE
6U	1,2-DICHLOROETHENE (TOTAL)	12U	METHYL BUTYL KETONE
6U	CHLOROFORM	6U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
6U	1,2-DICHLOROETHANE	6U	1,1,2,2-TETRACHLOROETHANE
12U	METHYL ETHYL KETONE	6U	TOLUENE
6U	1,1,1-TRICHLOROETHANE	6U	CHLOROBENZENE
6U	CARBON TETRACHLORIDE	6U	ETHYL BENZENE
6U	BROMODICHLOROMETHANE	6U	STYRENE
		6U	TOTAL XYLENES
		19	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00
CASE NO.: 16059 SAS NO.: D. NO.: AM33

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
11U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
11U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
11U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
11U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
40U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
50U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	11U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	11U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
11U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES
		12	PERCENT MOISTURE

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56293   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: SS-03   COLLECTION START: 03/20/91 1330   STOP: 00/00/00
CASE NO.: 16059   SAS NO.:   D. NO.: AM35

UG/KG	ANALYTICAL RESULTS
13U	CHLOROMETHANE
13U	BROMOMETHANE
13U	VINYL CHLORIDE
13U	CHLOROETHANE
30U	METHYLENE CHLORIDE
13U	ACETONE
7U	CARBON DISULFIDE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
7U	1,1-DICHLOROETHANE
7U	1,2-DICHLOROETHENE (TOTAL)
7U	CHLOROFORM
7U	1,2-DICHLOROETHANE
13U	METHYL ETHYL KETONE
7UJ	1,1,1-TRICHLOROETHANE
7UJ	CARBON TETRACHLORIDE
7UJ	BROMODICHLOROMETHANE
7UJ	1,2-DICHLOROPROPANE
7UJ	CIS-1,3-DICHLOROPROPENE
10J	TRICHLOROETHENE(TRICHLOROETHYLENE)
7UJ	DIBROMOCHLOROMETHANE
7UJ	1,1,2-TRICHLOROETHANE
7UJ	BENZENE
7UJ	TRANS-1,3-DICHLOROPROPENE
7UJ	BROMOFORM
13UJ	METHYL ISOBUTYL KETONE
13UJ	METHYL BUTYL KETONE
7UJ	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7UJ	1,1,2,2-TETRACHLOROETHANE
7UJ	TOLUENE
7UJ	CHLOROBENZENE
7UJ	ETHYL BENZENE
7UJ	STYRENE
7UJ	TOTAL XYLENES
29	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL
CITY: FT LAUDERD ST: FL
STATION ID: SB-03
COLLECTION START: 03/20/91 1405 STOP: 00/00/00
CASE NO.: 16059 SAS NO.: D. NO.: AM36

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
15U	CHLOROMETHANE	7U	1,2-DICHLOROPROPANE
15U	BROMOMETHANE	7U	CIS-1,3-DICHLOROPROPENE
15U	VINYL CHLORIDE	7U	TRICHLOROETHENE(TRICHLOROETHYLENE)
15U	CHLOROETHANE	7U	DIBROMOCHLOROMETHANE
30U	METHYLENE CHLORIDE	7U	1,1,2-TRICHLOROETHANE
20U	ACETONE	7U	BENZENE
7U	CARBON DISULFIDE	7U	TRANS-1,3-DICHLOROPROPENE
7U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	7U	BROMOFORM
7U	1,1-DICHLOROETHANE	15U	METHYL ISOBUTYL KETONE
7U	1,2-DICHLOROETHENE (TOTAL)	15U	METHYL BUTYL KETONE
7U	CHLOROFORM	7U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
7U	1,2-DICHLOROETHANE	7U	1,1,2,2-TETRACHLOROETHANE
15U	METHYL ETHYL KETONE	7U	TOLUENE
7U	1,1,1-TRICHLOROETHANE	7U	CHLOROBENZENE
7U	CARBON TETRACHLORIDE	7U	ETHYL BENZENE
7U	BROMODICHLOROMETHANE	7U	STYRENE
		7U	TOTAL XYLENES
		41	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA. 05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	2J	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
8U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	.5J	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
7U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
10U	ACETONE	.5J	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
5U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.   05/23/91

PURGEABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-369   SAMPLE NO. 56301   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M COHEN **
** SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL **
** STATION ID: TB-01W   COLLECTION START: 03/20/91 0700   STOP: 00/00/00 **
**
** CASE NO.: 16059   SAS NO.:   D. NO.: AM29 **
*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	CHLOROMETHANE	5U	1,2-DICHLOROPROPANE
10U	BROMOMETHANE	5U	CIS-1,3-DICHLOROPROPENE
10U	VINYL CHLORIDE	5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
10U	CHLOROETHANE	5U	DIBROMOCHLOROMETHANE
6U	METHYLENE CHLORIDE	5U	1,1,2-TRICHLOROETHANE
20U	ACETONE	5U	BENZENE
5U	CARBON DISULFIDE	5U	TRANS-1,3-DICHLOROPROPENE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)	5U	BROMOFORM
5U	1,1-DICHLOROETHANE	10U	METHYL ISOBUTYL KETONE
5U	1,2-DICHLOROETHENE (TOTAL)	10U	METHYL BUTYL KETONE
8U	CHLOROFORM	5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,2-DICHLOROETHANE	5U	1,1,2,2-TETRACHLOROETHANE
10U	METHYL ETHYL KETONE	5U	TOLUENE
5U	1,1,1-TRICHLOROETHANE	5U	CHLOROBENZENE
5U	CARBON TETRACHLORIDE	5U	ETHYL BENZENE
5U	BROMODICHLOROMETHANE	5U	STYRENE
		5U	TOTAL XYLENES

REMARKS   ***REMARKS***

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PURGEABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56302 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: TB-01S

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 0700 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM28

UG/KG	ANALYTICAL RESULTS
10U	CHLOROMETHANE
10U	BROMOMETHANE
10U	VINYL CHLORIDE
10U	CHLOROETHANE
20U	METHYLENE CHLORIDE
590J	ACETONE
5U	CARBON DISULFIDE
5U	1,1-DICHLOROETHENE(1,1-DICHLOROETHYLENE)
5U	1,1-DICHLOROETHANE
5U	1,2-DICHLOROETHENE (TOTAL)
5U	CHLOROFORM
5U	1,2-DICHLOROETHANE
10U	METHYL ETHYL KETONE
5U	1,1,1-TRICHLOROETHANE
5U	CARBON TETRACHLORIDE
5U	BROMODICHLOROMETHANE

UG/KG	ANALYTICAL RESULTS
5U	1,2-DICHLOROPROPANE
5U	CIS-1,3-DICHLOROPROPENE
5U	TRICHLOROETHENE(TRICHLOROETHYLENE)
5U	DIBROMOCHLOROMETHANE
5U	1,1,2-TRICHLOROETHANE
5U	BENZENE
5U	TRANS-1,3-DICHLOROPROPENE
5U	BROMOFORM
10U	METHYL ISOBUTYL KETONE
10U	METHYL BUTYL KETONE
5U	TETRACHLOROETHENE(TETRACHLOROETHYLENE)
5U	1,1,2,2-TETRACHLOROETHANE
5U	TOLUENE
5U	CHLOROBENZENE
5U	ETHYL BENZENE
5U	STYRENE
5U	TOTAL XYLENES
8	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56289  SAMPLE TYPE: SOIL        PROG ELEM: NSF    COLLECTED BY: M COHEN              **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD              ST: FL                   **
**   STATION ID: SS-01                                                COLLECTION START: 03/20/91  1035   STOP: 00/00/00      **
**   CASE NO.: 16059          SAS NO.:                                D. NO.: AM30                  MD NO: AM30              **
**                                                                                                                           **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

ANALYTICAL RESULTS UG/KG

10J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56290  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN           **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD             ST: FL               **
**   STATION ID: SB-01                                                COLLECTION START: 03/20/91  1145   STOP: 00/00/00 **
**   CASE.NO.: 16059          SAS NO.:                                D. NO.: AM31                MD NO: AM31           **
**                                                                                                                      **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

ANALYTICAL RESULTS UG/KG

6JN	BIS(DIMETHYLETHYL)CYCLOHEXADIENEDIONE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS PURGEABLE ORGANICS - DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56302 SAMPLE TYPE: SOIL	PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL	CITY: FT LAUDERD ST: FL
STATION ID: TB-01S	COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE.NO.: 16059 SAS NO.:	D. NO.: AM28 MD NO:

ANALYTICAL RESULTS UG/KG

20J 2 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

ISB/SAS
RECEIVED
JUN 6 1991
EPA - REGION IV
ATLANTA GA

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Extractable Organic Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-01 COLLECTION START: 03/20/91 1035 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM30

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
730U	PHENOL	3500U	3-NITROANILINE
730U	BIS(2-CHLOROETHYL) ETHER	730U	ACENAPHTHENE
730U	2-CHLOROPHENOL	3500U	2,4-DINITROPHENOL
730U	1,3-DICHLOROBENZENE	3500U	4-NITROPHENOL
730U	1,4-DICHLOROBENZENE	730U	DIBENZOFURAN
730U	1,2-DICHLOROBENZENE	730U	2,4-DINITROTOLUENE
730U	2-METHYLPHENOL	730U	DIETHYL PHTHALATE
730U	2,2'-CHLOROISOPROPYLETHER	730U	4-CHLOROPHENYL PHENYL ETHER
730U	(3-AND/OR 4-)METHYLPHENOL	730U	FLUORENE
730U	N-NITROSODI-N-PROPYLAMINE	3500U	4-NITROANILINE
730U	HEXACHLOROETHANE	3500U	2-METHYL-4,6-DINITROPHENOL
730UR	NITROBENZENE	730U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
730U	ISOPHORONE	730U	4-BROMOPHENYL PHENYL ETHER
730U	2-NITROPHENOL	730U	HEXACHLOROBENZENE (HCB)
730U	2,4-DIMETHYLPHENOL	3500U	PENTACHLOROPHENOL
730U	BIS(2-CHLOROETHOXY) METHANE	730U	PHENANTHRENE
730U	2,4-DICHLOROPHENOL	730U	ANTHRACENE
730U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
730UR	NAPHTHALENE	730U	DI-N-BUTYLPHTHALATE
730U	4-CHLOROANILINE	730U	FLUORANTHENE
730U	HEXACHLOROBUTADIENE	730U	PYRENE
730U	4-CHLORO-3-METHYLPHENOL	730U	BENZYL BUTYL PHTHALATE
730UR	2-METHYLNAPHTHALENE	1400U	3,3'-DICHLOROBENZIDINE
730U	HEXACHLOROCYCLOPENTADIENE (HCCP)	730U	BENZO(A)ANTHRACENE
730U	2,4,6-TRICHLOROPHENOL	730U	CHRYSENE
3500U	2,4,5-TRICHLOROPHENOL	730U	BIS(2-ETHYLHEXYL) PHTHALATE
730U	2-CHLORONAPHTHALENE	730U	DI-N-OCTYLPHTHALATE
3500U	2-NITROANILINE	730U	BENZO(B AND/OR K)FLUORANTHENE
730U	DIMETHYL PHTHALATE	730U	BENZO-A-PYRENE
730UJ	ACENAPHTHYLENE	730U	INDENO (1,2,3-CD) PYRENE
730U	2,6-DINITROTOLUENE	730U	DIBENZO(A,H)ANTHRACENE
		730U	BENZO(GHI)PERYLENE
		9	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56290 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-01

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1145 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM31

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
730U	PHENOL	3600U	3-NITROANILINE
730U	BIS(2-CHLOROETHYL) ETHER	730U	ACENAPHTHENE
730U	2-CHLOROPHENOL	3600U	2,4-DINITROPHENOL
730U	1,3-DICHLOROBENZENE	3600U	4-NITROPHENOL
730U	1,4-DICHLOROBENZENE	730U	DIBENZOFURAN
730U	1,2-DICHLOROBENZENE	730U	2,4-DINITROTOLUENE
730U	2-METHYLPHENOL	730U	DIETHYL PHTHALATE
730U	2,2'-CHLOROISOPROPYLETHER	730U	4-CHLOROPHENYL PHENYL ETHER
730U	(3-AND/OR 4-)METHYLPHENOL	730U	FLUORENE
730U	N-NITROSODI-N-PROPYLAMINE	3600U	4-NITROANILINE
730U	HEXACHLOROETHANE	3600U	2-METHYL-4,6-DINITROPHENOL
730UR	NITROBENZENE	730U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
730U	ISOPHORONE	730U	4-BROMOPHENYL PHENYL ETHER
730U	2-NITROPHENOL	730U	HEXACHLOROBENZENE (HCB)
730U	2,4-DIMETHYLPHENOL	3600U	PENTACHLOROPHENOL
730U	BIS(2-CHLOROETHOXY) METHANE	730U	PHENANTHRENE
730U	2,4-DICHLOROPHENOL	730U	ANTHRACENE
730U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
730UR	NAPHTHALENE	730U	DI-N-BUTYLPHTHALATE
730U	4-CHLOROANILINE	730U	FLUORANTHENE
730U	HEXACHLOROBUTADIENE	730U	PYRENE
730U	4-CHLORO-3-METHYLPHENOL	730U	BENZYL BUTYL PHTHALATE
730UR	2-METHYLNAPHTHALENE	1400U	3,3'-DICHLOROBENZIDINE
730U	HEXACHLOROCYCLOPENTADIENE (HCCP)	730U	BENZO(A)ANTHRACENE
730U	2,4,6-TRICHLOROPHENOL	730U	CHRYSENE
3600U	2,4,5-TRICHLOROPHENOL	730U	BIS(2-ETHYLHEXYL) PHTHALATE
730U	2-CHLORONAPHTHALENE	730U	DI-N-OCTYLPHTHALATE
3600U	2-NITROANILINE	730U	BENZO(B AND/OR K)FLUORANTHENE
730U	DIMETHYL PHTHALATE	730U	BENZO-A-PYRENE
730UJ	ACENAPHTHYLENE	730U	INDENO (1,2,3-CD) PYRENE
730U	2,6-DINITROTOLUENE	730U	DIBENZO(A,H)ANTHRACENE
		730U	BENZO(GHI)PERYLENE
		9	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: SS-02 COLLECTION START: 03/20/91 1015 STOP: 00/00/00 **
** **
** CASE NO.: 16059 SAS NO.: D. NO.: AM32 **
*** ***

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
410UR	PHENOL	2000UR	3-NITROANILINE
410UR	BIS(2-CHLOROETHYL) ETHER	410UR	ACENAPHTHENE
410UR	2-CHLOROPHENOL	2000UR	2,4-DINITROPHENOL
410UR	1,3-DICHLOROBENZENE	2000UR	4-NITROPHENOL
410UR	1,4-DICHLOROBENZENE	410UR	DIBENZOFURAN
410UR	1,2-DICHLOROBENZENE	410UR	2,4-DINITROTOLUENE
410UR	2-METHYLPHENOL	410UR	DIETHYL PHTHALATE
410UR	2,2'-CHLOROISOPROPYLETHER	410UR	4-CHLOROPHENYL PHENYL ETHER
410UR	(3-AND/OR 4-)METHYLPHENOL	410UR	FLUORENE
410UR	N-NITROSODI-N-PROPYLAMINE	2000UR	4-NITROANILINE
410UR	HEXACHLOROETHANE	2000UR	2-METHYL-4,6-DINITROPHENOL
410UR	NITROBENZENE	410UR	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
410UR	ISOPHORONE	410UR	4 BROMOPHENYL PHENYL ETHER
410UR	2-NITROPHENOL	410UR	HEXACHLOROBENZENE (HCB)
410UR	2,4-DIMETHYLPHENOL	2000UR	PENTACHLOROPHENOL
410UR	BIS(2-CHLOROETHOXY) METHANE	410UR	PHENANTHRENE
410UR	2,4-DICHLOROPHENOL	410UR	ANTHRACENE
410UR	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
410UR	NAPHTHALENE	700UR	DI-N-BUTYLPHTHALATE
410UR	4-CHLOROANILINE	410UR	FLUORANTHENE
410UR	HEXACHLOROBUTADIENE	410UR	PYRENE
410UR	4-CHLORO-3-METHYLPHENOL	410UR	BENZYL BUTYL PHTHALATE
410UR	2-METHYLNAPHTHALENE	820UR	3,3'-DICHLOROBENZIDINE
410UR	HEXACHLOROCYCLOPENTADIENE (HCCP)	410UR	BENZO(A)ANTHRACENE
410UR	2,4,6-TRICHLOROPHENOL	410UR	CHRYSENE
2000UR	2,4,5-TRICHLOROPHENOL	410UR	BIS(2-ETHYLHEXYL) PHTHALATE
410UR	2-CHLORONAPHTHALENE	410UR	DI-N-OCTYLPHTHALATE
2000UR	2 NITROANILINE	410UR	BENZO(B AND/OR K)FLUORANTHENE
410UR	DIMETHYL PHTHALATE	410UR	BENZO-A-PYRENE
410UR	ACENAPHTHYLENE	410UR	INDENO (1,2,3-CD) PYRENE
410UR	2,6-DINITROTOLUENE	410UR	DIBENZO(A,H)ANTHRACENE
		410UR	BENZO(GHI)PERYLENE
		19	PERCENT MOISTURE

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56292 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SB-02 COLLECTION START: 03/20/91 1255 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM33

UG/KG	ANALYTICAL RESULTS
760U	PHENOL
760U	BIS(2-CHLOROETHYL) ETHER
760U	2-CHLOROPHENOL
760U	1,3-DICHLOROBENZENE
760U	1,4-DICHLOROBENZENE
760U	1,2-DICHLOROBENZENE
760U	2-METHYLPHENOL
760U	2,2'-CHLOROISOPROPYLETHER
760U	(3-AND/OR 4-)METHYLPHENOL
760U	N-NITROSODI-N-PROPYLAMINE
760U	HEXACHLOROETHANE
760UR	NITROBENZENE
760U	ISOPHORONE
760U	2-NITROPHENOL
760U	2,4-DIMETHYLPHENOL
760U	BIS(2-CHLOROETHOXY) METHANE
760U	2,4-DICHLOROPHENOL
760U	1,2,4-TRICHLOROBENZENE
760UR	NAPHTHALENE
760U	4-CHLOROANILINE
760U	HEXACHLOROBUTADIENE
760U	4-CHLORO-3-METHYLPHENOL
760UR	2-METHYLNAPHTHALENE
760U	HEXACHLOROCYCLOPENTADIENE (HCCP)
760U	2,4,6-TRICHLOROPHENOL
3700U	2,4,5-TRICHLOROPHENOL
760U	2-CHLORONAPHTHALENE
3700U	2-NITROANILINE
760U	DIMETHYL PHTHALATE
760UJ	ACENAPHTHYLENE
760U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
3700U	3-NITROANILINE
760U	ACENAPHTHENE
3700U	2,4-DINITROPHENOL
3700U	4-NITROPHENOL
760U	DIBENZOFURAN
760U	2,4-DINITROTOLUENE
760U	DIETHYL PHTHALATE
760U	4-CHLOROPHENYL PHENYL ETHER
760U	FLUORENE
3700U	4-NITROANILINE
3700U	2-METHYL-4,6-DINITROPHENOL
760U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
760U	4-BROMOPHENYL PHENYL ETHER
760U	HEXACHLOROBENZENE (HCB)
3700U	PENTACHLOROPHENOL
760U	PHENANTHRENE
760U	ANTHRACENE
NA	CARBAZOLE
760U	DI-N-BUTYLPHTHALATE
760U	FLUORANTHENE
760U	PYRENE
760U	BENZYL BUTYL PHTHALATE
1500U	3,3'-DICHLOROBENZIDINE
760U	BENZO(A)ANTHRACENE
760U	CHRYSENE
760U	BIS(2-ETHYLHEXYL) PHTHALATE
760U	DI-N-OCTYLPHTHALATE
760U	BENZO(B AND/OR K)FLUORANTHENE
760U	BENZO-A-PYRENE
760U	INDENO (1,2,3-CD) PYRENE
760U	DIBENZO(A,H)ANTHRACENE
760U	BENZO(GHI)PERYLENE
12	PERCENT MOISTURE

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM35

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
930U	PHENOL	4500U	3-NITROANILINE
930U	BIS(2-CHLOROETHYL) ETHER	930U	ACENAPHTHENE
930U	2-CHLOROPHENOL	4500U	2,4-DINITROPHENOL
930U	1,3-DICHLOROBENZENE	4500U	4-NITROPHENOL
930U	1,4-DICHLOROBENZENE	930U	DIBENZOFURAN
930U	1,2-DICHLOROBENZENE	930U	2,4-DINITROTOLUENE
930U	2-METHYLPHENOL	930U	DIETHYL PHTHALATE
930U	2,2'-CHLOROISOPROPYLETHER	930U	4-CHLOROPHENYL PHENYL ETHER
930U	(3-AND/OR 4-)METHYLPHENOL	930U	FLUORENE
930U	N-NITROSODI-N-PROPYLAMINE	4500U	4-NITROANILINE
930U	HEXACHLOROETHANE	4500U	2-METHYL-4,6-DINITROPHENOL
930UR	NITROBENZENE	930U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
930U	ISOPHORONE	930U	4 BROMOPHENYL PHENYL ETHER
930U	2-NITROPHENOL	930U	HEXACHLOROBENZENE (HCB)
930U	2,4-DIMETHYLPHENOL	4500U	PENTACHLOROPHENOL
930U	BIS(2-CHLOROETHOXY) METHANE	930U	PHENANTHRENE
930U	2,4-DICHLOROPHENOL	930U	ANTHRACENE
930U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
930UR	NAPHTHALENE	930U	DI-N-BUTYLPHTHALATE
930U	4-CHLOROANILINE	930U	FLUORANTHENE
930U	HEXACHLOROBUTADIENE	930U	PYRENE
930U	4-CHLORO-3-METHYLPHENOL	930U	BENZYL BUTYL PHTHALATE
930UR	2-METHYLNAPHTHALENE	1800U	3,3'-DICHLOROBENZIDINE
930U	HEXACHLOROCYCLOPENTADIENE (HCCP)	930U	BENZO(A)ANTHRACENE
930U	2,4,6-TRICHLOROPHENOL	930U	CHRYSENE
4500U	2,4,5-TRICHLOROPHENOL	930U	BIS(2-ETHYLHEXYL) PHTHALATE
930U	2-CHLORONAPHTHALENE	930U	DI-N-OCTYLPHTHALATE
4500U	2 NITROANILINE	930U	BENZO(B AND/OR K)FLUORANTHENE
930U	DIMETHYL PHTHALATE	930U	BENZO-A-PYRENE
930UJ	ACENAPHTHYLENE	930U	INDENO (1,2,3-CD) PYRENE
930U	2,6-DINITROTOLUENE	930U	DIBENZO(A,H)ANTHRACENE
		930U	BENZO(GHI)PERYLENE
		29	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-03

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1405 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM36

UG/KG	ANALYTICAL RESULTS
1100U	PHENOL
1100U	BIS(2-CHLOROETHYL) ETHER
1100U	2-CHLOROPHENOL
1100U	1,3-DICHLOROBENZENE
1100U	1,4-DICHLOROBENZENE
1100U	1,2-DICHLOROBENZENE
1100U	2-METHYLPHENOL
1100U	2,2'-CHLOROISOPROPYLETHER
1100U	(3-AND/OR 4-)METHYLPHENOL
1100U	N-NITROSODI-N-PROPYLAMINE
1100U	HEXACHLOROETHANE
1100UR	NITROBENZENE
1100U	ISOPHORONE
1100U	2-NITROPHENOL
1100U	2,4-DIMETHYLPHENOL
1100U	BIS(2-CHLOROETHOXY) METHANE
1100U	2,4-DICHLOROPHENOL
1100U	1,2,4-TRICHLOROBENZENE
1100UR	NAPHTHALENE
1100U	4-CHLOROANILINE
1100U	HEXACHLOROBUTADIENE
1100U	4-CHLORO-3-METHYLPHENOL
1100UR	2-METHYLNAPHTHALENE
1100U	HEXACHLOROCYCLOPENTADIENE (HCCP)
1100U	2,4,6-TRICHLOROPHENOL
5500U	2,4,5-TRICHLOROPHENOL
1100U	2-CHLORONAPHTHALENE
5500U	2-NITROANILINE
1100U	DIMETHYL PHTHALATE
1100UJ	ACENAPHTHYLENE
1100U	2,6-DINITROTOLUENE

UG/KG	ANALYTICAL RESULTS
5500U	3-NITROANILINE
1100U	ACENAPHTHENE
5500U	2,4-DINITROPHENOL
5500U	4-NITROPHENOL
1100U	DIBENZOFURAN
1100U	2,4-DINITROTOLUENE
1100U	DIETHYL PHTHALATE
1100U	4-CHLOROPHENYL PHENYL ETHER
1100U	FLUORENE
5500U	4-NITROANILINE
5500U	2-METHYL-4,6-DINITROPHENOL
1100U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
1100U	4 BROMOPHENYL PHENYL ETHER
1100U	HEXACHLOROBENZENE (HCB)
5500U	PENTACHLOROPHENOL
1100U	PHENANTHRENE
1100U	ANTHRACENE
NA	CARBAZOLE
1100U	DI-N-BUTYLPHTHALATE
1100U	FLUORANTHENE
1100U	PYRENE
1100U	BENZYL BUTYL PHTHALATE
2200U	3,3'-DICHLOROBENZIDINE
1100U	BENZO(A)ANTHRACENE
1100U	CHRYSENE
1100U	BIS(2-ETHYLHEXYL) PHTHALATE
1100U	DI-N-OCTYLPHTHALATE
1100U	BENZO(B AND/OR K)FLUORANTHENE
1100U	BENZO-A-PYRENE
1100U	INDENO (1,2,3-CD) PYRENE
1100U	DIBENZO(A,H)ANTHRACENE
1100U	BENZO(GHI)PERYLENE
41	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56295   SAMPLE TYPE: GROUNDWA   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: MW-01   COLLECTION START: 03/20/91 1630   STOP: 00/00/00

CASE NO.: 16059   SAS NO.:   D. NO.: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4-BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2-NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM37

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4 BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	20U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2 NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

EXTRACTABLE ORGANICS DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56301 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: TB-01W COLLECTION START: 03/20/91 0700 STOP: 00/00/00

CASE NO.: 16059 SAS NO.: D. NO.: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
10U	PHENOL	50U	3-NITROANILINE
10U	BIS(2-CHLOROETHYL) ETHER	10U	ACENAPHTHENE
10U	2-CHLOROPHENOL	50U	2,4-DINITROPHENOL
10U	1,3-DICHLOROBENZENE	50U	4-NITROPHENOL
10U	1,4-DICHLOROBENZENE	10U	DIBENZOFURAN
10U	1,2-DICHLOROBENZENE	10U	2,4-DINITROTOLUENE
10U	2-METHYLPHENOL	10U	DIETHYL PHTHALATE
10U	2,2'-CHLOROISOPROPYLETHER	10U	4-CHLOROPHENYL PHENYL ETHER
10U	(3-AND/OR 4-)METHYLPHENOL	10U	FLUORENE
10U	N-NITROSODI-N-PROPYLAMINE	50U	4-NITROANILINE
10U	HEXACHLOROETHANE	50U	2-METHYL-4,6-DINITROPHENOL
10U	NITROBENZENE	10U	N-NITROSODIPHENYLAMINE/DIPHENYLAMINE
10U	ISOPHORONE	10U	4-BROMOPHENYL PHENYL ETHER
10U	2-NITROPHENOL	10U	HEXACHLOROBENZENE (HCB)
10U	2,4-DIMETHYLPHENOL	50U	PENTACHLOROPHENOL
10U	BIS(2-CHLOROETHOXY) METHANE	10U	PHENANTHRENE
10U	2,4-DICHLOROPHENOL	10U	ANTHRACENE
10U	1,2,4-TRICHLOROBENZENE	NA	CARBAZOLE
10U	NAPHTHALENE	10UJ	DI-N-BUTYLPHTHALATE
10U	4-CHLOROANILINE	10U	FLUORANTHENE
10U	HEXACHLOROBUTADIENE	10U	PYRENE
10U	4-CHLORO-3-METHYLPHENOL	10U	BENZYL BUTYL PHTHALATE
10U	2-METHYLNAPHTHALENE	20U	3,3'-DICHLOROBENZIDINE
10U	HEXACHLOROCYCLOPENTADIENE (HCCP)	10U	BENZO(A)ANTHRACENE
10U	2,4,6-TRICHLOROPHENOL	10UJ	CHRYSENE
50U	2,4,5-TRICHLOROPHENOL	10U	BIS(2-ETHYLHEXYL) PHTHALATE
10U	2-CHLORONAPHTHALENE	10U	DI-N-OCTYLPHTHALATE
50U	2-NITROANILINE	10U	BENZO(B AND/OR K)FLUORANTHENE
10U	DIMETHYL PHTHALATE	10U	BENZO-A-PYRENE
10U	ACENAPHTHYLENE	10U	INDENO (1,2,3-CD) PYRENE
10U	2,6-DINITROTOLUENE	10U	DIBENZO(A,H)ANTHRACENE
		10U	BENZO(GHI)PERYLENE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56291  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD            ST: FL                    **
**   STATION ID: SS-02                                                COLLECTION START: 03/20/91  1015   STOP: 00/00/00     **
**   CASE NO.: 16059          SAS NO.:                                D. NO.: AM32                MD NO: AM32               **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

ANALYTICAL RESULTS UG/KG

4000J   10 UNIDENTIFIED COMPOUNDS

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56293  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                 **
**   SOURCE: NAVTELL                                                   CITY: FT LAUDERD             ST: FL                      **
**   STATION ID: SS-03                                                 COLLECTION START: 03/20/91  1330   STOP: 00/00/00       **
**   CASE.NO.: 16059          SAS NO.:                                 D. NO.: AM35                MD NO: AM35                  **
**                                                                                                                              **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

ANALYTICAL RESULTS UG/KG

1000J   1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

```
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
**   PROJECT NO. 91-369    SAMPLE NO. 56294  SAMPLE TYPE: SOIL        PROG ELEM: NSF   COLLECTED BY: M COHEN                 **
**   SOURCE: NAVTELL                                                  CITY: FT LAUDERD            ST: FL                    **
**   STATION ID: SB-03                                                COLLECTION START: 03/20/91  1405   STOP: 00/00/00     **
**   CASE.NO.: 16059         SAS NO.:                                 D. NO.: AM36               MD NO: AM36                **
**                                                                                                                          **
*** * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * ***
```

ANALYTICAL RESULTS UG/KG

5000J   4 UNIDENTIFIED COMPOUNDS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

MISCELLANEOUS EXTRACTABLE COMPOUNDS - DATA REPORT

*** ***
** PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00 **
** CASE.NO.: 16059 SAS NO.: D. NO.: AM37 MD NO: AM37 **
** **
*** ***

ANALYTICAL RESULTS UG/L

10J 1 UNIDENTIFIED COMPOUND

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region IV
Environmental Services Division
College Station Road, Athens, Ga. 30613

SISB/SAS
RECEIVED
JUN [illegible] 1991
EPA - REGION IV
ATLANTA GA

*****MEMORANDUM******

DATE: 05/24/91

SUBJECT: Results of Pesticide/PCB Analysis;
91-369 NAVTELL
FT LAUDERD FL
CASE NO: 16059

FROM: Robert W. Knight
Chief, Laboratory Evaluation/Quality Assurance Section

TO: PHIL BLACKWELL

Attached are the results of analysis of samples collected as part of the subject project.

As a result of the Quality Assurance Review, certain data qualifiers may have been placed on the data. Attached is a DATA QUALIFIER REPORT which explains the reasons that these qualifiers were required.

If you have any questions please contact me.

ATTACHMENT

ORGANIC DATA QUALIFIER REPORT

Case Number 16059 Project Number 91-369 SAS Number

Site I.D. NAVTELL, Ft. Lauderdale, FL

Affected Samples	Compound or Fraction	Flag Used	Reason
Volatiles			
56293	1,1,1-trichloroethane	J	low internal standard areas
	carbon tetrachloride	J	low internal standard areas
	vinyl acetate	J	low internal standard areas
	bromodichloromethane	J	low internal standard areas
	1,2-dichloropropane	J	low internal standard areas
	cis and trans 1,3-dichloropropene	J	low internal standard areas
	trichloroethene	J	low internal standard areas
	dibromochloromethane	J	low internal standard areas
	1,1,2-trichloroethane	J	low internal standard areas
	benzene	J	low internal standard areas
	bromoform	J	low internal standard areas
	4-methyl-2-pentanone	J	low internal standard areas
	2-hexanone	J	low internal standard areas
	tetrachloroethene	J	low internal standard areas
	1,1,2,2-tetrachloroethane	J	low internal standard areas
	toluene	J	low internal standard areas
	chlorobenzene	J	low internal standard areas
	ethylbenzene	J	low internal standard areas
	styrene	J	low internal standard areas
	xylene (total)	J	low internal standard areas
56295, 56300	trichloroethene	J	less than quantitation limit
56300	benzene	J	less than quantitation limit
56302	acetone	J	greater than quantitation limit
Extractables			
56289, 56290, 56292	nitrobenzene	R	unacceptable QC recovery
56293, 56294	naphthalene	R	unacceptable QC recovery
	2-methylnaphthalene	R	unacceptable QC recovery
	acenaphthylene	J	low QC recovery
56291	all extractables	R	sample extracted over 30 days after date of sampling
56295, 56300	chrysene	J	low QC recovery
56301	di-n-butylphthalate	J	low QC recovery
Pesticides			
56291	heptachlor epoxide	J	<quantitation limit
	dieldrin	J	<quantitation limit
	4,4'-DDT	J	<quantitation limit
	alpha-chlordane	J	<quantitation limit
	gamma-chlordane	J	<quantitation limit
	all other pesticides	R	excessive extraction holding time

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56289 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-01
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1035 STOP: 00/00/00
D. NUMBER: AM30

UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC
18U	BETA-BHC
18U	DELTA-BHC
18U	GAMMA-BHC (LINDANE)
18U	HEPTACHLOR
18U	ALDRIN
18U	HEPTACHLOR EPOXIDE
18U	ENDOSULFAN I (ALPHA)
35U	DIELDRIN
35U	4,4'-DDE (P,P'-DDE)
35U	ENDRIN
35U	ENDOSULFAN II (BETA)
35U	4,4' DDD (P,P'-DDD)
35U	ENDOSULFAN SULFATE
35U	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
180U	METHOXYCHLOR
35U	ENDRIN KETONE
NA	ENDRIN ALDEHYDE
	CHLORDANE (TECH. MIXTURE) /1
180U	GAMMA-CHLORDANE /2
180U	ALPHA-CHLORDANE /2
350U	TOXAPHENE
180U	PCB-1016 (AROCLOR 1016)
180U	PCB-1221 (AROCLOR 1221)
180U	PCB-1232 (AROCLOR 1232)
180U	PCB-1242 (AROCLOR 1242)
180U	PCB-1248 (AROCLOR 1248)
350U	PCB-1254 (AROCLOR 1254)
350U	PCB-1260 (AROCLOR 1260)
9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56290   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: SB-01   COLLECTION START: 03/20/91 1145   STOP: 00/00/00
CASE NUMBER: 16059   SAS NUMBER: D. NUMBER: AM31

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC	180U	METHOXYCHLOR
18U	BETA-BHC	35U	ENDRIN KETONE
18U	DELTA-BHC	NA	ENDRIN ALDEHYDE
18U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
18U	HEPTACHLOR	180U	GAMMA-CHLORDANE /2
18U	ALDRIN	180U	ALPHA-CHLORDANE /2
18U	HEPTACHLOR EPOXIDE	350U	TOXAPHENE
18U	ENDOSULFAN I (ALPHA)	180U	PCB-1016 (AROCLOR 1016)
35U	DIELDRIN	180U	PCB-1221 (AROCLOR 1221)
35U	4,4'-DDE (P,P'-DDE)	180U	PCB-1232 (AROCLOR 1232)
35U	ENDRIN	180U	PCB-1242 (AROCLOR 1242)
35U	ENDOSULFAN II (BETA)	180U	PCB-1248 (AROCLOR 1248)
35U	4,4'-DDD (P,P'-DDD)	350U	PCB-1254 (AROCLOR 1254)
35U	ENDOSULFAN SULFATE	350U	PCB-1260 (AROCLOR 1260)
35U	4,4'-DDT (P,P'-DDT)	9	PERCENT MOISTURE

REMARKS

REMARKS

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.
05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56291 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SS-02
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1015 STOP: 00/00/00
D. NUMBER: AM32

UG/KG	ANALYTICAL RESULTS
9.9UR	ALPHA-BHC
9.9UR	BETA-BHC
9.9UR	DELTA-BHC
9.9UR	GAMMA-BHC (LINDANE)
9.9UR	HEPTACHLOR
9.9UR	ALDRIN
3.3J	HEPTACHLOR EPOXIDE
9.9UR	ENDOSULFAN I (ALPHA)
4.3J	DIELDRIN
20UR	4,4'-DDE (P,P'-DDE)
20UR	ENDRIN
20UR	ENDOSULFAN II (BETA)
20UR	4,4'-DDD (P,P' DDD)
20UR	ENDOSULFAN SULFATE
8.6J	4,4'-DDT (P,P'-DDT)

UG/KG	ANALYTICAL RESULTS
99UR	METHOXYCHLOR
20UR	ENDRIN KETONE
NA	ENDRIN ALDEHYDE
--	CHLORDANE (TECH. MIXTURE) /1
61J	GAMMA-CHLORDANE /2
45J	ALPHA-CHLORDANE /2
200UR	TOXAPHENE
99UR	PCB-1016 (AROCLOR 1016)
99UR	PCB-1221 (AROCLOR 1221)
99UR	PCB-1232 (AROCLOR 1232)
99UR	PCB-1242 (AROCLOR 1242)
99UR	PCB-1248 (AROCLOR 1248)
200UR	PCB-1254 (AROCLOR 1254)
200UR	PCB-1260 (AROCLOR 1260)
19	PERCENT MOISTURE

REMARKS
EXCESSIVE HOLDING TIME

REMARKS

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369   SAMPLE NO. 56292   SAMPLE TYPE: SOIL   PROG ELEM: NSF   COLLECTED BY: M COHEN
SOURCE: NAVTELL   CITY: FT LAUDERD   ST: FL
STATION ID: SB-02   COLLECTION START: 03/20/91 1255   STOP: 00/00/00
CASE NUMBER: 16059   SAS NUMBER: D. NUMBER: AM33

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
18U	ALPHA-BHC	180U	METHOXYCHLOR
18U	BETA-BHC	36U	ENDRIN KETONE
18U	DELTA-BHC	NA	ENDRIN ALDEHYDE
18U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
18U	HEPTACHLOR	180U	GAMMA-CHLORDANE /2
18U	ALDRIN	180U	ALPHA-CHLORDANE /2
18U	HEPTACHLOR EPOXIDE	360U	TOXAPHENE
18U	ENDOSULFAN I (ALPHA)	180U	PCB-1016 (AROCLOR 1016)
36U	DIELDRIN	180U	PCB-1221 (AROCLOR 1221)
36U	4,4'-DDE (P,P'-DDE)	180U	PCB-1232 (AROCLOR 1232)
36U	ENDRIN	180U	PCB-1242 (AROCLOR 1242)
36U	ENDOSULFAN II (BETA)	180U	PCB-1248 (AROCLOR 1248)
36U	4,4'-DDD (P,P'-DDD)	360U	PCB-1254 (AROCLOR 1254)
36U	ENDOSULFAN SULFATE	360U	PCB-1260 (AROCLOR 1260)
36U	4,4'-DDT (P,P'-DDT)	12	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE   *NA-NOT ANALYZED   *NAI-INTERFERENCES   *J-ESTIMATED VALUE   *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN   *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS   1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56293 SAMPLE TYPE: SOIL PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: SS-03 COLLECTION START: 03/20/91 1330 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM35

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
22U	ALPHA-BHC	220U	METHOXYCHLOR
22U	BETA-BHC	45U	ENDRIN KETONE
22U	DELTA-BHC	NA	ENDRIN ALDEHYDE
22U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
22U	HEPTACHLOR	220U	GAMMA-CHLORDANE /2
22U	ALDRIN	220U	ALPHA-CHLORDANE /2
22U	HEPTACHLOR EPOXIDE	450U	TOXAPHENE
22U	ENDOSULFAN I (ALPHA)	220U	PCB-1016 (AROCLOR 1016)
45U	DIELDRIN	220U	PCB-1221 (AROCLOR 1221)
45U	4,4'-DDE (P,P'-DDE)	220U	PCB-1232 (AROCLOR 1232)
45U	ENDRIN	220U	PCB-1242 (AROCLOR 1242)
45U	ENDOSULFAN II (BETA)	220U	PCB-1248 (AROCLOR 1248)
45U	4,4'-DDD (P,P'-DDD)	450U	PCB-1254 (AROCLOR 1254)
45U	ENDOSULFAN SULFATE	450U	PCB-1260 (AROCLOR 1260)
45U	4,4'-DDT (P,P'-DDT)	29	PERCENT MOISTURE

FOOTNOTES

*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56294 SAMPLE TYPE: SOIL
SOURCE: NAVTELL
STATION ID: SB-03
CASE NUMBER: 16059 SAS NUMBER:

PROG ELEM: NSF COLLECTED BY: M COHEN
CITY: FT LAUDERD ST: FL
COLLECTION START: 03/20/91 1405 STOP: 00/00/00
D. NUMBER: AM36

UG/KG	ANALYTICAL RESULTS	UG/KG	ANALYTICAL RESULTS
27U	ALPHA-BHC	270U	METHOXYCHLOR
27U	BETA-BHC	54U	ENDRIN KETONE
27U	DELTA-BHC	NA	ENDRIN ALDEHYDE
27U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
27U	HEPTACHLOR	270U	GAMMA-CHLORDANE /2
27U	ALDRIN	270U	ALPHA-CHLORDANE /2
27U	HEPTACHLOR EPOXIDE	540U	TOXAPHENE
27U	ENDOSULFAN I (ALPHA)	270U	PCB-1016 (AROCLOR 1016)
54U	DIELDRIN	270U	PCB-1221 (AROCLOR 1221)
54U	4,4'-DDE (P,P'-DDE)	270U	PCB-1232 (AROCLOR 1232)
54U	ENDRIN	270U	PCB-1242 (AROCLOR 1242)
54U	ENDOSULFAN II (BETA)	270U	PCB-1248 (AROCLOR 1248)
54U	4,4'-DDD (P,P'-DDD)	540U	PCB-1254 (AROCLOR 1254)
54U	ENDOSULFAN SULFATE	540U	PCB-1260 (AROCLOR 1260)
54U	4,4'-DDT (P,P'-DDT)	41	PERCENT MOISTURE

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56295 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: MW-01 COLLECTION START: 03/20/91 1630 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM34

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

*** ***

** PROJECT NO. 91-369 SAMPLE NO. 56300 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN **
** SOURCE: NAVTELL CITY: FT LAUDERD ST: FL **
** STATION ID: MW-02 COLLECTION START: 03/20/91 1435 STOP: 00/00/00 **
** CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM37 **

*** ***

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

SAMPLE AND ANALYSIS MANAGEMENT SYSTEM
EPA-REGION IV ESD, ATHENS, GA.

05/23/91

PESTICIDES/PCB'S DATA REPORT

PROJECT NO. 91-369 SAMPLE NO. 56301 SAMPLE TYPE: GROUNDWA PROG ELEM: NSF COLLECTED BY: M COHEN
SOURCE: NAVTELL CITY: FT LAUDERD ST: FL
STATION ID: TB-01W COLLECTION START: 03/20/91 0700 STOP: 00/00/00
CASE NUMBER: 16059 SAS NUMBER: D. NUMBER: AM29

UG/L	ANALYTICAL RESULTS	UG/L	ANALYTICAL RESULTS
.050U	ALPHA-BHC	.50U	METHOXYCHLOR
.050U	BETA-BHC	.10U	ENDRIN KETONE
.050U	DELTA-BHC	NA	ENDRIN ALDEHYDE
.050U	GAMMA-BHC (LINDANE)		CHLORDANE (TECH. MIXTURE) /1
.050U	HEPTACHLOR	.50U	GAMMA-CHLORDANE /2
.050U	ALDRIN	.50U	ALPHA-CHLORDANE /2
.050U	HEPTACHLOR EPOXIDE	1.0U	TOXAPHENE
.050U	ENDOSULFAN I (ALPHA)	.50U	PCB-1016 (AROCLOR 1016)
.10U	DIELDRIN	.50U	PCB-1221 (AROCLOR 1221)
.10U	4,4'-DDE (P,P'-DDE)	.50U	PCB-1232 (AROCLOR 1232)
.10U	ENDRIN	.50U	PCB-1242 (AROCLOR 1242)
.10U	ENDOSULFAN II (BETA)	.50U	PCB-1248 (AROCLOR 1248)
.10U	4,4'-DDD (P,P'-DDD)	1.0U	PCB-1254 (AROCLOR 1254)
.10U	ENDOSULFAN SULFATE	1.0U	PCB-1260 (AROCLOR 1260)
.10U	4,4'-DDT (P,P'-DDT)		

FOOTNOTES
*A-AVERAGE VALUE *NA-NOT ANALYZED *NAI-INTERFERENCES *J-ESTIMATED VALUE *N-PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
*K-ACTUAL VALUE IS KNOWN TO BE LESS THAN VALUE GIVEN *L-ACTUAL VALUE IS KNOWN TO BE GREATER THAN VALUE GIVEN
*U-MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT.
*R-QC INDICATES THAT DATA UNUSABLE. COMPOUND MAY OR MAY NOT BE PRESENT. RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION.
*C-CONFIRMED BY GCMS 1. WHEN NO VALUE IS REPORTED, SEE CHLORDANE CONSTITUENTS.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

WD-WPB

MAR 08 1991

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Farbman - Stein
Attn: Mr. Lee Tomback
3449 NW 55 Street
Ft. Lauderdale, Florida 33309

Re: Navtell
FLD118624188

Dear Mr. Tomback:

The United States Environmental Protection Agency (EPA), pursuant to the authority and requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 U.S.C. 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499, is planning to conduct an investigation of the above referenced site. EPA has reason to believe that there may be a release or threat of a release of hazardous substances from the site into the surrounding environment. The purpose of the investigation is to determine the nature and extent of contamination at the site and to determine what, if any, further response action would be appropriate.

EPA is requesting permission for access to your property beginning on March 19, 1991 and continuing through the completion of the investigation on or about March 21, 1991. Activities to be conducted during the investigation may include:

1. Inspect, sketch and photograph the premises;

2. Collect surface and subsurface soil samples;

3. Collect groundwater and subsurface water samples;

4. Collect sediment samples;

5. Conduct air monitoring;

6. Transportation of equipment onto and about the site as necessary to accomplish the activities above, including trucks and sampling equipment.

The above sampling activity will be conducted by personnel from EPA Region IV's Field Investigation Team (FIT). Mitch Cohen of FIT will contact you prior to the actual site visit to make final arrangements and note any changes.

This letter serves as a formal request for permission to obtain access to your property. If you will voluntarily give permission for EPA to conduct the above described investigation of the Navtell property, please sign and return the original of this letter to:

Mr. Gerald F. Foree
Waste Programs Branch-SAS
U.S. EPA - Region IV
345 Courtland Street, N.E.
Atlanta, GA 30365
Fax Number: (404) 347-4862

Your signature will represent your agreement to grant EPA, its contractor(s), subcontractor(s), and employees, access to your property during the periods stated and for the purpose of conducting some or all of the activities described above and any other activity deemed necessary by EPA to perform properly the investigation. Failure to respond to this letter will be deemed a denial of the request for access to your property.

Split samples will be made available if requested. However, you will be required to furnish your own containers as well as your own laboratory analyses.

If you have any questions, please contact me at (404) 347-5065. Your cooperation in this matter is appreciated.

Sincerely,

Gerald F. Foree

Gerald F. Foree
Site Assessment Section-WD

cc: Tillman McAdams, EPA, SAS-WD
Eric Nuzie, FDER
Julie Keller, NUS Corporation
Bob Donaghue, NUS Corporation
Alex Padva, FDER, SE District

I hereby grant permission for EPA and contractors to enter the above referenced for purposes of carrying out the sampling described above.

Signature: ________________________

Date: ________________________

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

UNITED STATES ENVRONMENTAL PROTECTION AGENCY

REGION IV

SITE ASSESSMENT SECTION, WASTE PROGRAMS BRANCH
WASTE MANAGEMENT DIVISION
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FACSIMILE TRANSMISSION COVER SHEET

DATE: March 13, 1991 *NO. OF PAGES (INCLUDE COVER SHEET)* 4

TO: Lee Tomback *FAX TELEPHONE NO.* 305/4863647

ADDRESS: ____________ *TELEPHONE NO.* 305/7331333

IF THE FOLLOWING MESSAGE IS RECEIVED POORLY, PLEASE CALL Gerald Foree

IN OUR OFFICE AT FTS 257-5065 OR COMMERCIAL (404) 347-5065

SPECIAL NOTES OR INSTRUCTIONS:

MACHINE TYPE	*FAX NUMBER*	
HARRIS/3M	*FTS NUMBER*	*257-4862*
2127	*COMMERCIAL*	*(404) 347-4862*

* *PLEASE NUMBER ALL PAGES*

PAGE 1 OF __

EPA

p. A12). The potentiometric surface of the artesian Floridan aquifer is approximately 40 to 50 feet amsl. The regional groundwater flow direction in the Floridan aquifer is east toward the coast (Ref. 12, p. B51). The aquifer is approximately 1,000 feet bls and is undeveloped as a drinking water resource due to its high salinity (Refs. 7, sheets 1, 2; 10, pp. 67, 83; 11, p. A8)

2.0 SAMPLING INVESTIGATION

The sampling investigation will include the collection of a total of 16 environmental samples; consisting of surface soil, subsurface soil, sediment, and groundwater. Samples will be analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanides, and metals. Analyses will be performed under the Contract Laboratory Program (CLP). The number of samples and sample locations are tentative and may change as field conditions warrant. Sample descriptions are provided in Table 1, and proposed sample locations are shown on Figure 3.

2.1 Surface Soil Sampling

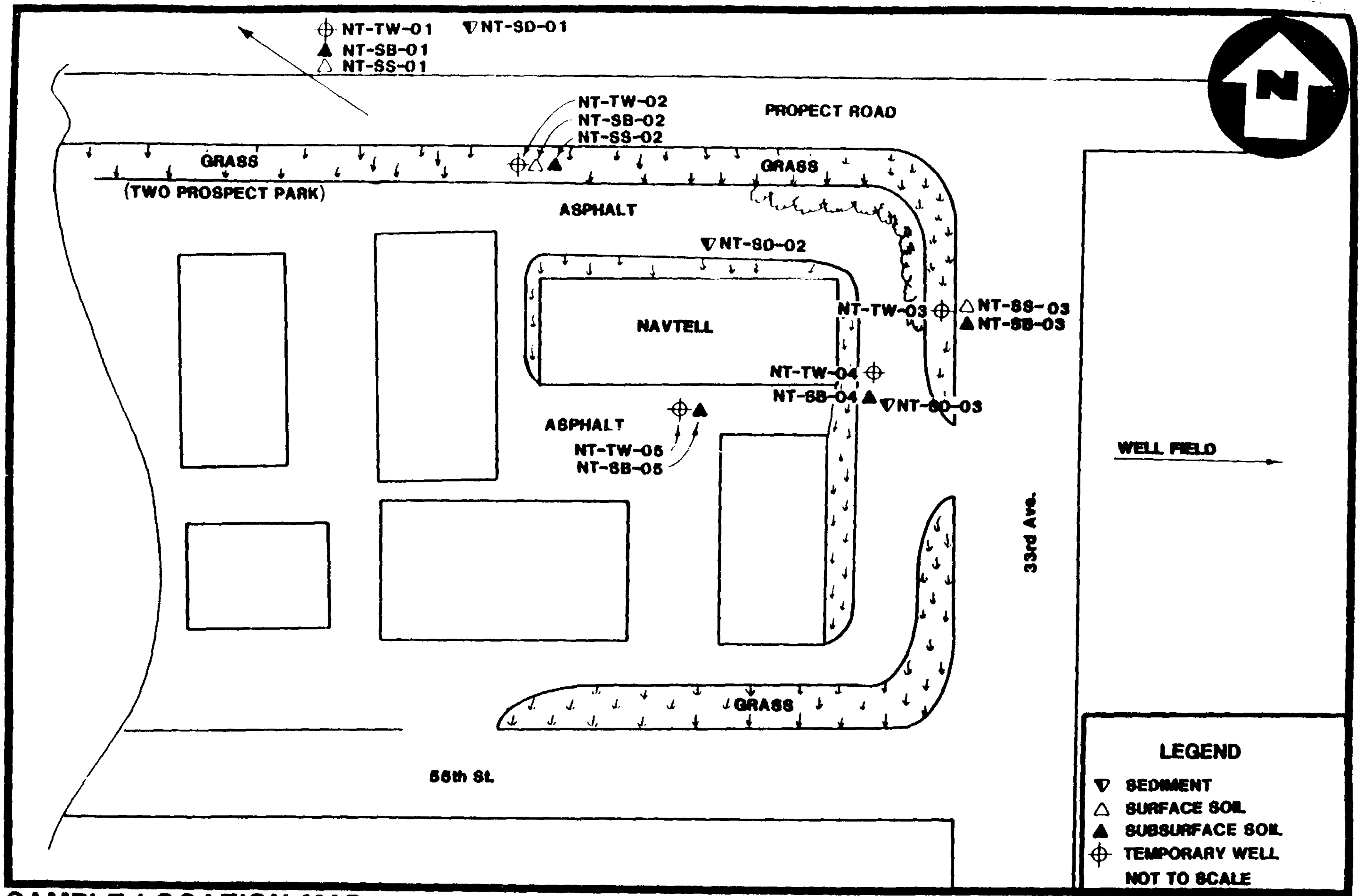
Three surface soil samples will be collected during the investigation. One will be collected off site as a control sample. Two will be collected from grassy areas near the facility building, with one being northwest and the other being southeast.

2.2 Subsurface Soil Sampling

Five subsurface soil samples will be collected as part of the study. One will be collected off site and to the northwest as a control sample. One will be collected northwest of the facility building, while three will be collected along the southeastern boundary of the facility. An asphalt coring apparatus will aid in accessing soil below paved areas.

2.3 Sediment Sampling

Three sediment samples will be collected during the study. One will be collected off site and to the northwest as a control. Two others will be collected from French storm drains located in the asphalt-paved areas surrounding the facility building.



SAMPLE LOCATION MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 3

NUS CORPORATION

TABLE 1

SAMPLE LOCATIONS AND RATIONALE
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
NT-SS-01	Surface Soil	Northwest and off site at 0-2' below land surface (bls)	Control sample to isolate facility
NT-SS-02	Surface Soil	Northwest of facility at 0-2' bls	Determine the presence or absence of contaminants
NT-SS-03	Surface Soil	Southeast of facility at 0-2' bls	Determine the presence or absence of contaminants
NT-SB-01	Subsurface Soil	Northwest and off site at 3-10' bls	Control sample to isolate facility
NT-SB-02	Subsurface Soil	Northwest of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-03	Subsurface Soil	Southeast of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-04	Subsurface Soil	Southeast corner of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-05	Subsurface Soil	South-central portion of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SD-01	Sediment	Northwest and off site at 0-6" bls	Control sample to isolate facility
NT-SD-02	Sediment	North of facility from a French drain at 0-6" bls	Determine the presence or absence of contaminants
NT-SD-03	Sediment	Southeast of facility from a French drain at 0-6" bls	Determine the presence or absence of contaminants
NT-TW-01	Groundwater	Northwest and off site	Control sample to isolate facility
NT-TW-02	Groundwater	Northwest portion of the facility	Determine the presence or absence of contaminants
NT-TW-03	Groundwater	Southeast portion of the facility	Determine the presence or absence of contaminants
NT-TW-04	Groundwater	Southeast corner of the facility	Determine the presence or absence of contaminants
NT-TW-05	Groundwater	South-central portion of the facility	Determine the presence or absence of contaminants

NT - Navtell
SS - Surface Soil
SB - Subsurface Soil
SD - Sediment
TW - Groundwater, Temporary Well

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

UNITED STATES ENVRONMENTAL PROTECTION AGENCY

REGION IV

SITE ASSESSMENT SECTION, WASTE PROGRAMS BRANCH
WASTE MANAGEMENT DIVISION
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FACSIMILE TRANSMISSION COVER SHEET

DATE: March 8, 1991 NO. OF PAGES (INCLUDE COVER SHEET) 4

TO: Mr. Lee Tomback FAX TELEPHONE NO. 305/4863647

ADDRESS: TELEPHONE NO. 305/733 1333

IF THE FOLLOWING MESSAGE IS RECEIVED POORLY, PLEASE CALL Gerald Foree

IN OUR OFFICE AT FTS 257-5065 OR COMMERCIAL (404) 347-5065

****

SPECIAL NOTES OR INSTRUCTIONS:

****

MACHINE TYPE	FAX NUMBER	
HARRIS/3M	FTS NUMBER	257-4862
2127	COMMERCIAL	(404) 347-4862

* PLEASE NUMBER ALL PAGES

EPA

U. S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, ATHENS, GEORGIA

MEMORANDUM

DATE: MAR 07 1991

SUBJECT: Screening Site Inspection Study Plan, Phase II, Navtell, Fort Lauderdale, Broward County, Florida; EPA ID No. FLD118624188, ESD Project No. 91E-326

FROM: Roger E. Carlton, Environmental Engineer
Hazardous Waste Section
Environmental Compliance Branch
Environmental Services Division

TO: Al Hanke, Chief
Site Assessment Section
Waste Programs Branch
Waste Management Division

THRU: William R. Bokey, Chief
Hazardous Waste Section
Environmental Compliance Branch
Environmental Services Division

The Screening Site Inspection Study Plan, Phase II, Navtell, Fort Lauderdale, Broward County, Florida, is complete as is.

If you have any questions, please contact me at (404) 546-3308 or (FTS) 250-3308.

cc: Finger/Wright/Waldrop
Bokey/Hall
Knight
Franklin

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ENVIRONMENTAL SERVICES DIVISION
ATHENS, GEORGIA 30613

MEMORANDUM

DATE: March 6, 1991

SUBJECT: SSI Study Plans

FROM: Pat Stamp Pat Stamp
Laboratory Quality Assurance Specialist
Laboratory Evaluation & Quality Assurance Section

TO: Al Hanke
Site Assessment Section
Waste Programs Branch
Waste Management Division

THRU: Wade Knight, Chief WK
Laboratory Evaluation & Quality Assurance Section

We have reviewed the following documents and have no comments:

- Rite-Way Automotive, Ft. Lauderdale, FL
- Navtel, Ft. Lauderdale, FL
- Classic Graphics, Inc., Ft. Lauderdale, FL

R-586-2-1-34

STUDY PLAN
SCREENING SITE INSPECTION, PHASE II
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA
EPA ID #: FLD118624188

Prepared Under
TDD No. F4-9005-71
CONTRACT NO. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 28, 1991

NUS CORPORATION
SUPERFUND DIVISION

Prepared By	Reviewed By	Approved By
Mitch Cohen, P.E.	Donnie McCurry for Roger Franklin	Phil Blackwell
Project Manager	Assistant Regional Project Manager	Regional Project Manager

MAR 05 1991

NOTICE

TABLE OF CONTENTS

FIGURES

TABLES

STUDY PLAN
SCREENING SITE INSPECTION, PHASE II
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA
EPA ID #FLD118624188
TDD NO. F4-9005-71

1.0 INTRODUCTION

The NUS Corporation Region 4 Field Investigation Team (FIT) has been tasked by the U.S. Environmental Protection Agency (EPA), Waste Management Division to conduct a Screening Site Inspection (SSI) at the Navtell facility in Fort Lauderdale, Broward County, Florida. The inspection will be performed under the authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Tasks will be performed to satisfy the requirements stated in Phase II of Technical Directive Document (TDD) number F4-9005-71.

1.1 Objectives

The objectives of this Phase II inspection will be to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection will seek to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation will be made regarding future activities at the site.

Specific elements are:

- Obtain information to prepare a site-specific preliminary HRS score.
- Provide EPA the necessary information to make decisions on any other actions warranted at the site.

1.2 Scope of Work

The scope of this investigation will include the following activities:

- Obtain and review background materials relevant to HRS scoring of site.
- Evaluate target populations associated with the groundwater, surface water, air, and onsite exposure pathways.
- Determine location and distance to nearest potable well.
- Develop a site sketch, to scale.
- Collect environmental samples to be analyzed under the Contract Laboratory Program (CLP).

1.3 Schedule

Week of March 18, 1991

1.4 Personnel

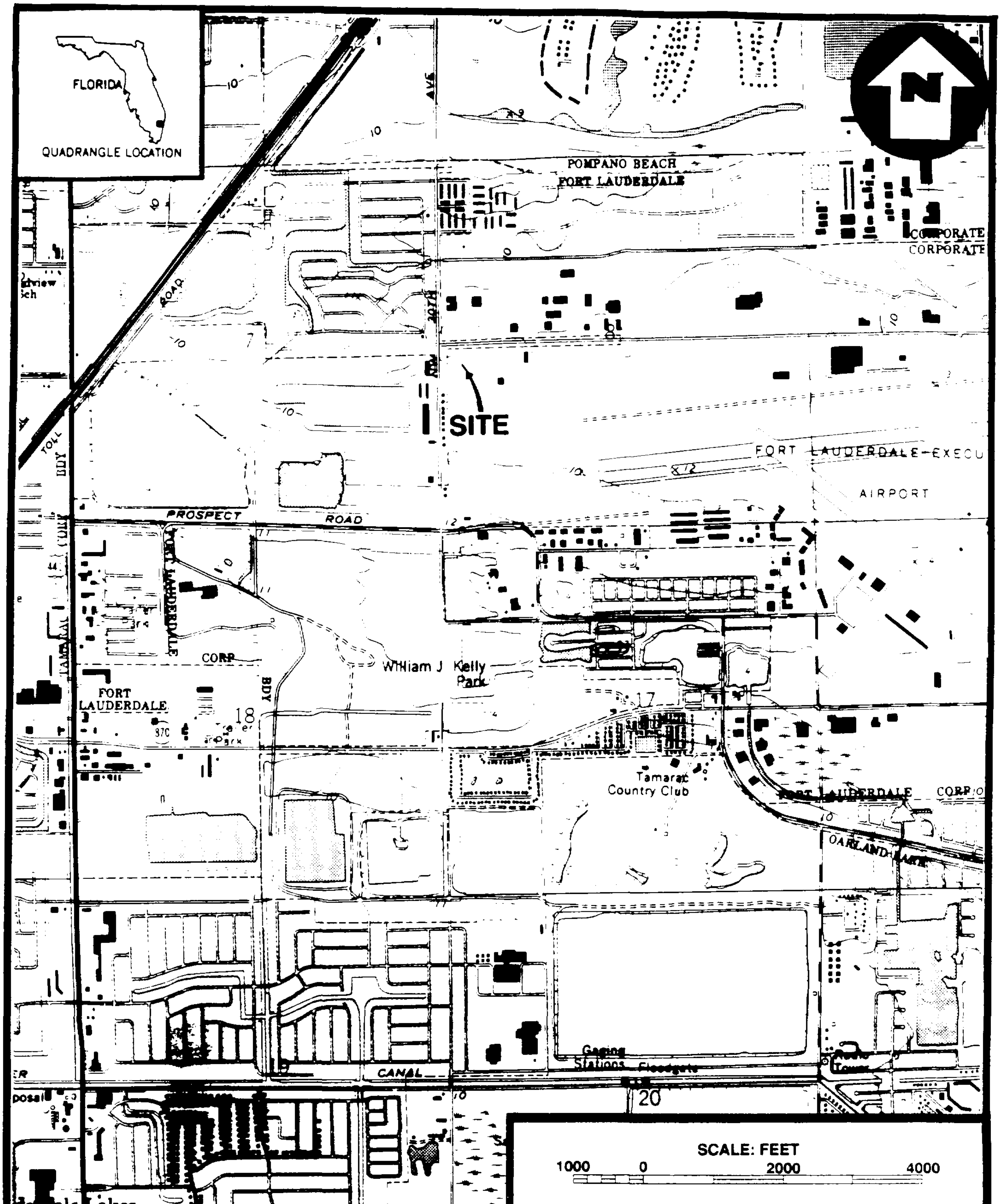
Project Manager - Mitch Cohen
Other personnel as required

1.5 Permits and Authorization Requirements

EPA is responsible for obtaining access to the site and permission to take photographs of site. In addition, EPA is responsible for all permits which may be required to accomplish this task.

1.6 Site History and Description

Navtell is located on N.W. 55th Street within the city limits of Fort Lauderdale just west of the Executive Airport. The facility sold and repaired data communications test equipment (Ref. 1). The facility is in a commercial/industrial area, with the nearest residential area to the west, approximately 0.4 mile (Refs. 1, 2) (Figures 1, 2).

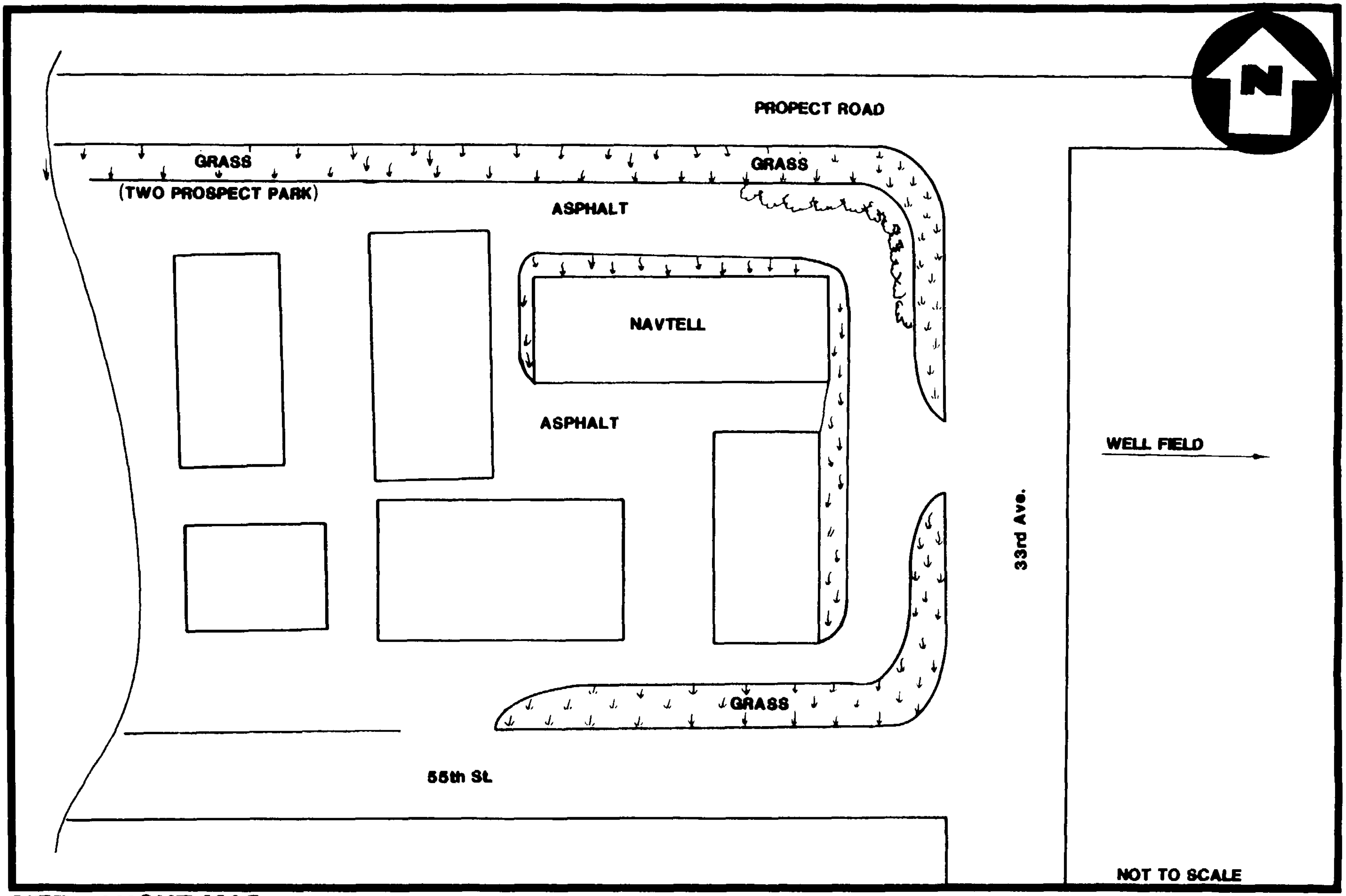


BASE MAP IS A PORTION OF THE USGS 7.5 MINUTE QUADRANGLE, FORT LAUDERDALE NORTH, 1983.

SITE LOCATION MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 1

NUS CORPORATION



SITE LAYOUT MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 2

NUS CORPORATION

Navtell began operations prior to 1984 and ceased operations at this location by 1985 (Ref. 1). The property is presently owned by C.B. Institutional Fund VI (Ref. 2). The company repaired and sold data communications equipment. They used approximately 20 gallons/year of cleaning solvents in their processes, but there were no spills or disposals reported on site. The spent solvents were placed in small containers until retrieved by municipal trash collectors. Also, some soldering was performed at this facility (Ref. 1).

1.7 Regional Hydrogeology

The facility is located in the Atlantic Coastal Ridge region of the Coastal Plain Physiographic Province (Ref. 3, plate 1-C). Topographically, a large portion of this area is flat lying, although low ridges parallel the eastern shoreline. In general, the area exists at low altitudes as elevations in Broward County typically range between 2 and 10 feet above mean sea level (amsl). There are very few naturally occurring streams. Instead, a network of manmade canals serve to control surface water run-off and induce groundwater seepage, through which groundwater elevations in the Biscayne aquifer are lowered (Ref. 4, pp. 1, 44-45). Broward County is underlain by the Biscayne aquifer, which is a sole-source aquifer (Refs. 5, p. 3; 6). Surface soil in the area consists primarily of fine sands (Ref. 4, sheet 8, index).

The Biscayne aquifer is a highly permeable, wedge-shaped, unconfined aquifer that is about 300 feet thick. In eastern Broward County, the aquifer is thickest in the east and thins to the west. The Biscayne aquifer underlying the facility consists of the Pamlico Sand (quartz sand), the Anastasia Formation (sandstone and limestone), the Key Largo Limestone (coralline reef rock), and the Tamiami Formation (limestones, sands, and marls) (Refs. 5, p. 3; 7, sheets 1, 2). Based on available borehole data, the Key Largo Limestone appears to be areally discontinuous in the Executive Airport area. Recharge to the Biscayne aquifer is primarily through rainfall. Downward infiltration of the rainwater is rapid due to the presence of highly permeable sandy soils along the coast, as well as the presence of the solution cavities and conduits in the limestone (Ref. 5, p. 15). In southern Florida, at least one-fourth of the limestone rock is cavernous with interconnecting solution cavities, which are generally filled with sand (Ref. 8, p. 133). The water table slopes eastward toward the coast; however, locally, the direction of groundwater flow in the Biscayne aquifer may be influenced by drainage canals and wellfields (Refs. 5, pp. 3, 15; 7, sheets 1, 2). Water-table depth around the facility ranges from approximately 1 to 9 feet below land surface (bls) (Ref.9, pp. 30, 31).

Wells completed in the Biscayne aquifer are an average of 80 to 120 feet bls and provide all municipal water supplies for Broward County (Ref. 6). Transmissivity of the Biscayne aquifer ranges from 5.4×10^4 to 4.0×10^5 ft^2/day, and storage coefficients are as high as 3.4×10^{-1} (Ref. 5, pp. 3, 8). Hydraulic conductivity ranges from 6.5×10^3 to 9.38×10^3 ft/day along coastal Broward County (Ref. 9, p. 39).

Below the aquifer of concern is the Hawthorn Group, a confining unit present in the site area. The majority of the Hawthorn is predominantly comprised of siliciclastics; however, there is a carbonate unit in the lower portion of the group (Ref. 10, p. 56). In Broward County, the Hawthorn Group consists of, in descending order, the Peace River and Arcadia formations (Ref. 10, pp. 55, 67, 83). The Peace River Formation is comprised of quartz sands, clays, and carbonates. Approximately two-thirds of the formation is siliciclastics with carbonate beds scattered throughout (Ref. 10, p. 79). The Arcadia Formation consists primarily of limestones and dolostones that contain sand (quartz) and phosphate, and are often clay rich (Ref. 10, p. 56). In the site area, the Peace River Formation is approximately 300 feet thick, and the Arcadia Formation is about 400 feet thick (Ref. 10, pp. 67, 83). In areas where the underlying Floridan aquifer is tightly confined by the Hawthorn Group, model-derived leakage coefficient values for the Hawthorn average approximately 0.01 in/yr/ft (Ref. 11, p. A12).

Beneath the Hawthorn Group are sedimentary units which comprise the Floridan Aquifer System (Refs. 10, p. 55; 12, p. B44). The Floridan aquifer is a sequence of carbonate rocks, primarily limestones in the upper two-thirds, and dolostones with evaporite beds in the lower portion. These carbonate rocks of the Floridan aquifer are generally highly permeable and are hydraulically connected in varying degrees (Ref. 12, p. B45).

The Floridan Aquifer System consists of an upper and lower aquifer with a middle confining unit (Ref. 12, pp. B18-B33, B44-B45). In this area, the Suwannee Limestone, Ocala Group, and the upper third of the Avon Park Formation comprise the upper Floridan aquifer. The middle confining unit consists of low-permeability sediments, which constitute the middle third of the Avon Park Formation. The lower Floridan aquifer is comprised of the lower third of the Avon Park Formation and the Oldsmar and Cedar Keys formations (Ref. 12, pp. B44, B47). Located in the lower portion of the Floridan aquifer is a highly permeable, cavernous unit, termed the Boulder zone (Ref. 11, p. A8).

The entire Floridan Aquifer System is approximately 2,800 feet thick in the site area (Ref. 12, plate 27). Transmissivities range from 1.0×10^4 to 5.0×10^4 ft^2/day for the majority of the aquifer, but aquifer tests in the Boulder zone have suggested transmissivities greater than 3.0×10^6 ft^2/day (Ref. 11, pp. A11-A12). Storage coefficients for the upper Floridan range from 1×10^{-5} to 2×10^{-2} (Ref. 11,

p. A12). The potentiometric surface of the artesian Floridan aquifer is approximately 40 to 50 feet amsl. The regional groundwater flow direction in the Floridan aquifer is east toward the coast (Ref. 12, p. B51). The aquifer is approximately 1,000 feet bls and is undeveloped as a drinking water resource due to its high salinity (Refs. 7, sheets 1, 2; 10, pp. 67, 83; 11, p. A8).

2.0 SAMPLING INVESTIGATION

The sampling investigation will include the collection of a total of 16 environmental samples; consisting of surface soil, subsurface soil, sediment, and groundwater. Samples will be analyzed for extractable and purgeable organic compounds, pesticides, PCBs, cyanides, and metals. Analyses will be performed under the Contract Laboratory Program (CLP). The number of samples and sample locations are tentative and may change as field conditions warrant. Sample descriptions are provided in Table 1, and proposed sample locations are shown on Figure 3.

2.1 Surface Soil Sampling

Three surface soil samples will be collected during the investigation. One will be collected off site as a control sample. Two will be collected from grassy areas near the facility building, with one being northwest and the other being southeast.

2.2 Subsurface Soil Sampling

Five subsurface soil samples will be collected as part of the study. One will be collected off site and to the northwest as a control sample. One will be collected northwest of the facility building, while three will be collected along the southeastern boundary of the facility. An asphalt coring apparatus will aid in accessing soil below paved areas.

2.3 Sediment Sampling

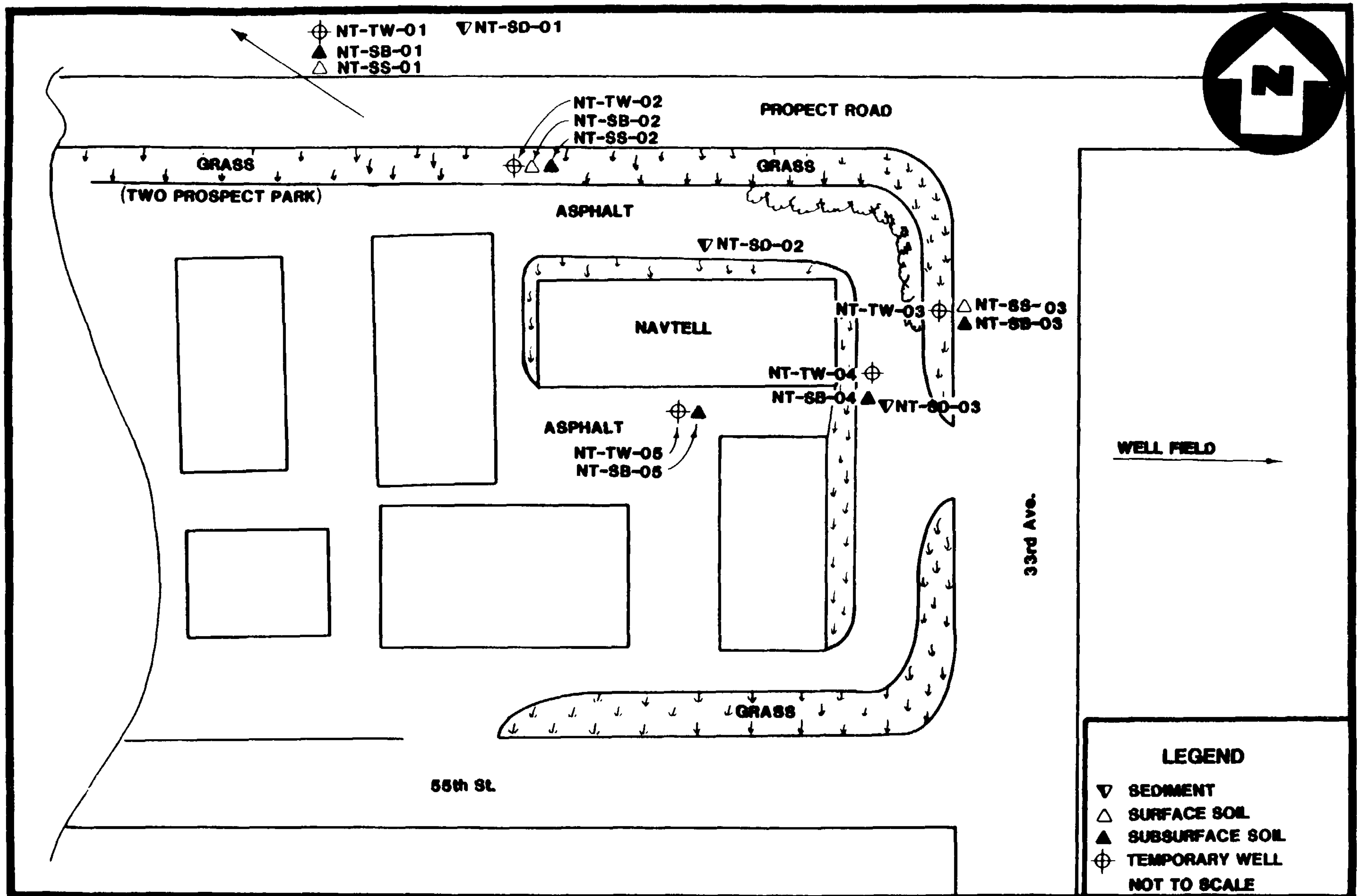
Three sediment samples will be collected during the study. One will be collected off site and to the northwest as a control. Two others will be collected from French storm drains located in the asphalt-paved areas surrounding the facility building.

TABLE 1

SAMPLE LOCATIONS AND RATIONALE
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

Sample Code	Sample Type	Location	Rationale
NT-SS-01	Surface Soil	Northwest and off site at 0-2' below land surface (bls)	Control sample to isolate facility
NT-SS-02	Surface Soil	Northwest of facility at 0-2' bls	Determine the presence or absence of contaminants
NT-SS-03	Surface Soil	Southeast of facility at 0-2' bls	Determine the presence or absence of contaminants
NT-SB-01	Subsurface Soil	Northwest and off site at 3-10' bls	Control sample to isolate facility
NT-SB-02	Subsurface Soil	Northwest of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-03	Subsurface Soil	Southeast of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-04	Subsurface Soil	Southeast corner of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SB-05	Subsurface Soil	South-central portion of facility at 3-10' bls	Determine the presence or absence of contaminants
NT-SD-01	Sediment	Northwest and off site at 0-6" bls	Control sample to isolate facility
NT-SD-02	Sediment	North of facility from a French drain at 0-6" bls	Determine the presence or absence of contaminants
NT-SD-03	Sediment	Southeast of facility from a French drain at 0-6" bls	Determine the presence or absence of contaminants
NT-TW-01	Groundwater	Northwest and off site	Control sample to isolate facility
NT-TW-02	Groundwater	Northwest portion of the facility	Determine the presence or absence of contaminants
NT-TW-03	Groundwater	Southeast portion of the facility	Determine the presence or absence of contaminants
NT-TW-04	Groundwater	Southeast corner of the facility	Determine the presence or absence of contaminants
NT-TW-05	Groundwater	South-central portion of the facility	Determine the presence or absence of contaminants

NT - Navtell
SS - Surface Soil
SB - Subsurface Soil
SD - Sediment
TW - Groundwater, Temporary Well



SAMPLE LOCATION MAP
NAVTELL
FORT LAUDERDALE, BROWARD COUNTY, FLORIDA

FIGURE 3

NUS CORPORATION

2.4 Groundwater Sampling

Five temporary wells will be established in the same boreholes used to collect subsurface soil. One will establish control conditions off site, while four will be placed around the facility building.

2.5 Analytical and Container Requirements

Sample containers used will be in accordance with the requirements specified in the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986. The following is a description of the analysis and types of containers required.

Analyses	Container	Preservatives**
Ext. Organics, Water	1 gal., amber glass*	None
Volatile Organics, Water	40 ml, glass vial*	4 drops conc. HCL to pH <2
Metals, Water	1 liter, plastic	50% HNO_3 to pH <2
Cyanide, Water	1 liter, plastic	NaOH to pH >12
Ext. Organics, Soil/Sediment	8 oz., glass*	None
Volatile Organics, Soil/Sediment	4 oz., glass*	None
Inorganics, Soil/Sediment	8 oz., glass*	None

* Sample container lids are lined with teflon.

** All samples will be iced to 4°C upon collection.

2.6 Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation will be in accordance with the standard operating procedures as specified in Section 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, April 1, 1986.

All laboratory analyses and laboratory quality assurance procedures used during this investigation will be in accordance with standard procedures and protocols as specified in the Laboratory Operations and Quality Control Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division, October 24, 1990; or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the contract analytical laboratory program.

REFERENCES

1. Potential Hazardous Waste Site Preliminary Assessment (EPA Form 2070-12) and attached cover sheet for Navtell. Filed by Willard Murray, E.C. Jordan Company, November 6, 1985.

2. NUS Corporation Field Logbook No. F4-2345 for Navtell, TDD No. F4-9005-71. Documentation of facility reconnaissance, May 30, 1990.

3. William A. White, The Geomorphology of the Florida Peninsula, Geological Bulletin No. 51 (Tallahassee, Florida: Bureau of Geology, 1970).

4. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Broward County, Florida (July 1976).

5. H. Klein and J.E. Hull, Biscayne Aquifer, Southeast, Florida, Water-Resources Investigations 78-107 (U.S. Geological Survey, 1978).

6. Willie Smitherman, NUS Corporation, interoffice memorandum to K.D. Pass, March 22, 1990. Subject: Municipal water systems for Broward County, Florida.

7. Carmen R. Causaras, Geology of the Surficial Aquifer System, Broward County, Florida, Water Resources Investigations Report 84-4068 (U.S. Geological Survey, 1985).

8. Garald G. Parker and others, Water Resources of Southeastern Florida, Water-Supply Paper No. 1255 (U.S. Geological Survey, 1955).

9. Melvin C. Schroeder, Howard Klein, and Nevin D. Hoy, Biscayne Aquifer of Dade and Broward Counties, Report of Investigations No. 17 (U.S. Geological Survey, 1958).

10. Thomas M. Scott, The Lithostratigraphy of the Hawthorn Group (Miocene) of Florida, Bulletin No. 59 (Tallahassee, Florida: Florida Geological Survey, 1988).

11. Richard H. Johnston and Peter W. Bush, Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama, Professional Paper 1403-A (U.S. Geological Survey, 1988).

12. James A. Miller, Hydrogeologic Framework of the Floridan Aquifer System in Florida and in Parts of Georgia, Alabama, and South Carolina, Professional Paper 1403-B (U.S. Geological Survey, 1986).

NUS
CORPORATION
1927 LAKESIDE PARKWAY
SUITE 614
TUCKER, GEORGIA 30084
404 938 7710

G586-8-0-35

August 2, 1990

Mr. A.R. Hanke
Waste Programs Branch
Waste Management Division
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Date: Sept 13, 1990
Site Disposition: SI Phase II
EPA Project Manager: J. McKeown

Subject: Screening Site Inspection, Phase I
Navtell
Fort Lauderdale, Broward County, Florida
EPA ID No. FLD118624188
TDD No. F4-9005-71

Dear Mr. Hanke:

FIT 4 conducted a Screening Site Inspection, Phase I, of the Navtell facility in Fort Lauderdale, Broward County, Florida. This inspection included a review of EPA and state file material, completion of a target survey, and a drive-by reconnaissance of the facility and surrounding area.

Navtell is located on N.W. 55th Street within the city limits of Fort Lauderdale just west of the Executive Airport. The facility sold and repaired data communications test equipment (Ref. 1). The facility is in a commercial/industrial area, with the nearest residential area to the west, approximately 0.4 mile (Refs. 1, 2).

Navtell began operations prior to 1984 and ceased operations at this location by 1985 (Ref. 1). The property is presently owned by C. B. Institutional Fund VI (Ref. 2). The company repaired and sold data communications equipment. They used approximately 20 gallons/year of cleaning solvents in their processes, but there were no spills or disposals reported on site. The spent solvents were placed in small containers until retrieved by municipal trash collectors. Also, some soldering was performed at this facility (Ref. 1).

The Navtell facility is in the Atlantic Coastal Ridge region of the Coastal Plain Physiographic Province (Ref. 3, plate C). The area is a low almost level plain with low ridges near the eastern shore. There are very few natural streams, but rather a network of canals which provide drainage. The average elevation for Broward County is 2 to 10 feet above mean sea level. Surface soils primarily consist of fine sands (Ref. 4, pp. 1, 44, 45). Broward County is underlain by the Biscayne aquifer, which is a sole source aquifer (Refs. 5, p. 3; 6). The climate is subtropical and humid with an average temperature of 75.4° F and a net annual rainfall of 13 inches (Refs. 4, pp. 1, 42; 7, pp. 43, 63). The 1-year, 24-hour rainfall is 4.5 inches (Ref. 8, p. 93).

The Biscayne aquifer is a highly permeable, wedge-shaped, unconfined aquifer that is about 300 feet thick in Eastern Broward County and thins to the west. The Biscayne aquifer underlying the facility consists of the Pamlico Sand (quartz sand), the Anastasia Formation (sandstone and limestone), and

Mr. A. R. Hanke
Environmental Protection Agency
TDD No. F4-9005-71
August 2, 1990 - page 2

the Tamiami Formation (limestones, sands, and marls) (Ref. 9, sheets 1, 2). The geologic formations present in the Executive Airport area are somewhat variable in thickness, and the stratigraphic sequence may vary. Recharge to the Biscayne aquifer is primarily through rainfall. Downward infiltration of the rainwater is rapid due to the highly permeable sandy soils along the coast, as well as the presence of the solution cavities and conduits in the limestone. In southern Florida, at least one fourth of the limestone rock is cavernous with interconnecting solution cavities, generally filled with sand (Ref. 10, p. 133). The water table slopes eastward toward the coast; however, locally, the direction of flow may be influenced by drainage canals and wellfields (Refs. 5, pp. 3, 12; 9, sheets 1, 2). Water table depth around the facility ranges from approximately 1 to 9 feet below land surface (bls) (Ref. 11, pp. 30, 31).

Wells completed in the aquifer are an average of 80 to 120 feet bls and provide all the municipal water supplies for Broward County (Ref. 6). Transmissivity of the Biscayne aquifer ranges from 5.4×10^4 to 4.0×10^5 ft²/day, and the storativities are as high as 0.34 (Ref. 5, pp. 3, 8). Permeability ranges from 5.0×10^3 to 7.0×10^4 gpd/ft² (Ref. 11, p. 39). The hydraulic conductivity of the Biscayne aquifer ranges from 1 cm/sec to 1×10^{-3} cm/sec (Ref. 12, p. 29).

Below the aquifer of concern is the Hawthorn Group, a confining unit consisting of sand and clay. It separates the Biscayne aquifer from the Floridan aquifer and is about 300 feet thick. The Floridan Aquifer System is a sequence of carbonate rock of generally high permeability that is hydraulically connected in varying degrees. It consists of an upper and lower aquifer with a middle confining unit. The aquifer is about 1,500 feet thick in this area and is unused as a drinking water source due to its high salinity (Refs. 13, pp. 4, 5; 14, pp. A7, A8).

All of the residences in the area obtain their potable water from several municipalities drawing from the Biscayne aquifer (Ref. 6). The nearest potable well is located approximately 530 feet north of the facility in the Prospect Wellfield. The following list contains the wellfields maintained by the county and local governments within a 4-mile radius of Navtell facility, the number of wells in each field, the number of connections, and the distance from the facility:

Name of Wellfield		No. of Wells	No. of Connections	Distance from Facility (feet)
1)	Prospect Wellfield	43	63,200	530
2)	Broadview	3	2,185	5,280
3)	Broward County - 1A	7	10,843	9,500
4)	North Lauderdale	3	6,328	11,620
5)	Pompano Beach	22	16,900	14,700
6)	Broward County - 1B	5	3,397	15,310
7)	Lauderhill	7	8,600	17,425
8)	Margate	12	23,723	17,425
9)	Tamarac	13	17,074	13,480

The Prospect Wellfield provides water to the city of Ft. Lauderdale (56,000 connections). The city of Ft. Lauderdale then sells some of the water to the cities of Oakland Park (2,700 connections) and Wilton Manor (4,500 connections). All systems within the 4-mile radius of the facility have emergency hookups with other municipalities in the area. Several municipalities have multiple wellfields, and some of the multiple wellfields are located outside the 4-mile radius; however in all cases the water is mixed in the distribution lines (Refs. 6, 15).

Surface water at the Navtell facility flows along N.W. 55th Street (Ref. 2). Personnel at the Fort Lauderdale Public Works Department reported that all side streets near the Fort Lauderdale Executive Airport are serviced by French drains that channel water directly into the ground without prior treatment (Ref. 16).

Several endangered and threatened species may be found within 4 miles of the Navtell facility. The Fern Forest Nature Center is found approximately 2 miles west of the facility (Ref. 2). The federally threatened eastern indigo snake (Drymarchon corais couperi) is found in the area (Refs. 1; 17; 18, p. 3; 19). The state-designated endangered hand adder's tounge fern (Ophioglossum palmatum) is also found in the nature center area (Refs. 1; 19; 20, pp. 44, 45). The bird's-nest spleenwort (Asplenium serratum) and the star-scale fern (Pleopeltis revoluta), both state-designated endangered species, may also be found in the area (Refs. 1; 20, pp. 9, 49, 50).

The nearest residence is found 1,320 feet west of the facility. The nearest school is 3,500 feet southeast, and the nearest church is 3,500 feet southeast of the facility (Refs. 1, 2). There is a trailer park located about 0.25 mile west of the facility on Prospect Road (Ref. 2).

Based upon the above referenced material and the enclosures, FIT 4 recommends that Phase II of this Screening Site Inspection be conducted on a medium-priority basis. If you have any comments or questions about this assessment, please call me at NUS Corporation.

Very truly yours,

Sheri Panabaker

Sheri Panabaker
Project Manager

Approved:

B.A. Donaghue

SP/tb

Enclosures

cc: John McKeown

REFERENCES

1. Potential Hazardous Waste Site Preliminary Assessment (EPA Form 2070-12) and attached cover sheet for Navtell. Filed by Willard Murray, E. C. Jordan Company, November 6, 1985.

2. NUS Corporation Field Logbook No F4-2345 for Navtell, TDD F4-9005-71. Documentation of facility reconnaissance, May 30, 1990.

3. William A. White, The Geomorphology of the Florida Peninsula, Geological Bulletin No. 51, (Tallahassee, Florida: Bureau of Geology 1970).

4. U.S. Department of Agriculture Soil Conservation Service, Soil Survey of Broward County, Florida (July 1976).

5. H. Klein and J.E. Hull, Biscayne Aquifer, Southeast, Florida, Water-Resources Investigations 78-107 (U.S. Geological Survey, 1978)

6. Willie Smitherman, interoffice memorandum to K.D. Pass, NUS Corporation, March 22, 1990. Subject: Municipal water systems for Broward County, Florida

7. U.S. Department of Commerce, Climatic Atlas of the United States (Washington, D.C.: GPO, June 1968) Reprint 1983, National Oceanic and Atmospheric Administration.

8. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper No. 40 (Washington, D.C.: GPO, 1961).

9. Carmen R. Causareas, Geology of the Surficial Aquifer System, Broward County, Florida, Water Resources Investigations Report 84-4068 (U.S. Geological Survey, 1985).

10. Garald G. Parker and others, Water Resources of Southeastern Florida, Water-Supply Paper No. 1255 (U.S. Geological Survey, 1955).

11. Melvin C. Schroeder, Howard Klein, and Nevin D. Hay, Biscayne Aquifer of Dade and Broward Counties, Report of Investigations No. 17 (U.S. Geological Survey, 1958).

12. R.A. Freeze and J.A. Cherry, Groundwater (Englewood Cliffs, NJ: Prentice-Hall, Inc., 1979).

13. Fredrick W. Meyer, Evaluation of Hydraulic Characteristics of a Deep Artesian Aquifer from Natural Water-Level Fluctuations, Miami, Florida, Report of Investigations No. 75 (U.S. Geological Survey, 1974).

14. Richard H. Johnston and Peter W. Bush, Summary of the Hydrology of the Floridan Aquifer System in Florida and in Parts of Georgia, South Carolina, and Alabama, Professional Paper 1403-A (U.S. Geological Survey, 1988).

15. Charles F. Petrone, Regional Water Facilities Manager, city of Ft. Lauderdale, Florida, telephone conversation with Willie Smitherman, NUS Corporation, April 27, 1990. Subject: Status of municipal wells near the Ft. Lauderdale Executive Airport.

16. Steve Anderson, Ft. Lauderdale Public Works, telephone conversation with Greg Thomas, NUS Corporation, April 27, 1990. Subject: Surface water drainage near Ft. Lauderdale Executive Airport.

17. Curtis Morgan, "Road Plan Saves Tortoise Habitat," The Miami Herald, April 26, 1990.

18. Don A. Wood, Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida (Tallahassee, Florida: Florida Game and Fresh Water Fish Commission, 1988).

19. Paddy Cunningham, Fern Forest Nature Center, telephone conversation with William E. Vasser, NUS Corporation, May 3, 1990. Subject: Endangered and threatened species at the Fern Forest Nature Center.

20. Daniel B. Ward, "Rare and Endangered Biota of Florida", Volume Five, Plants (Gainesville, Florida: University Presses of Florida, 1978).

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

NAVTELL
EPA SITE NUMBER FLD118624188
FT. LAUDERDALE
BROWARD COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY S. PANABAKER
OF NUC CORPORATION
ON 07/12/90

DATE OF THIS REPORT: 07/12/90
DATE OF LAST MODIFICATION: 07/12/90

GROUND WATER ROUTE SCORE	:	86.67
SURFACE WATER ROUTE SCORE	:	0.00
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	50.10

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
DEPTH TO WATER TABLE	4 FEET		
DEPTH TO BOTTOM OF WASTE	0 FEET		
DEPTH TO AQUIFER OF CONCERN	4 FEET	3	6
PRECIPITATION	63.0 INCHES		
EVAPORATION	50.0 INCHES		
NET PRECIPITATION	13.0 INCHES	2	2
PERMEABILITY	1.0X10-3 CM/SEC	2	2
PHYSICAL STATE		3	3
TOTAL ROUTE CHARACTERISTICS SCORE:			13
3. CONTAINMENT		3	3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,18			18
WASTE QUANTITY CUBIC YDS	2501		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	2501 CU. YDS	8	8
TOTAL WASTE CHARACTERISTICS SCORE:			26
5. TARGETS			
GROUND WATER USE		3	9
DISTANCE TO NEAREST WELL	530 FEET		
AND	MATRIX VALUE	40	40
TOTAL POPULATION SERVED	390841 PERSONS		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	102853		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			49

GROUND WATER ROUTE SCORE (Sgw) = 86.67

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	ROUTE NOT SCORED		N/A
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER			
SITE WITHIN CLOSED BASIN			
FACILITY SLOPE			
INTERVENING SLOPE			
24-HOUR RAINFALL			
DISTANCE TO DOWN-SLOPE WATER			
PHYSICAL STATE			
TOTAL ROUTE CHARACTERISTICS SCORE:			N/A
3. CONTAINMENT			N/A
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:			
WASTE QUANTITY CUBIC YDS			
DRUMS			
GALLONS			
TONS			
TOTAL			
TOTAL WASTE CHARACTERISTICS SCORE:			N/A
5. TARGETS			
SURFACE WATER USE			
DISTANCE TO SENSITIVE ENVIRONMENT			
COASTAL WETLANDS			
FRESH-WATER WETLANDS			
CRITICAL HABITAT			
DISTANCE TO STATIC WATER			
DISTANCE TO WATER SUPPLY INTAKE AND TOTAL POPULATION SERVED	MATRIX VALUE		
NUMBER OF HOUSES			
NUMBER OF PERSONS			
NUMBER OF CONNECTIONS			
NUMBER OF IRRIGATED ACRES			
TOTAL TARGETS SCORE:			N/A

SURFACE WATER ROUTE SCORE (Ssw) = 0.00

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: NAVTELL
AS OF 07/12/90

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		13
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	26
TARGETS	X	49

= 49686 /57,330 X 100 = 86.67 = S_{gw}

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		0
CONTAINMENT	X	0
WASTE CHARACTERISTICS	X	0
TARGETS	X	0

= 0 /64,350 X 100 = 0.00 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	86.67	7511.69
SURFACE WATER ROUTE SCORE (S_{sw})	0.00	0.00
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		7511.69
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		86.67
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		50.10

HAZARD RANKING SYSTEM SCORING SUMMARY

FOR

NAVTELL
EPA SITE NUMBER FLD118624188
FT. LAUDERDALE
BROWARD COUNTY, FL
EPA REGION: 4

SCORE STATUS: IN PREPARATION

SCORED BY S. PANABAKER
OF NUC CORPORATION
ON 07/12/90

DATE OF THIS REPORT: 07/12/90
DATE OF LAST MODIFICATION: 07/12/90

GROUND WATER ROUTE SCORE	:	63.33
SURFACE WATER ROUTE SCORE	:	0.00
AIR ROUTE SCORE	:	0.00
MIGRATION SCORE	:	36.61

HRS GROUND WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0
2. ROUTE CHARACTERISTICS			
DEPTH TO WATER TABLE	4 FEET		
DEPTH TO BOTTOM OF WASTE	0 FEET		
DEPTH TO AQUIFER OF CONCERN	4 FEET	3	6
PRECIPITATION	63.0 INCHES		
EVAPORATION	50.0 INCHES		
NET PRECIPITATION	13.0 INCHES	2	2
PERMEABILITY	1.0X10-3 CM/SEC	2	2
PHYSICAL STATE		3	3
TOTAL ROUTE CHARACTERISTICS SCORE:			13
3. CONTAINMENT		3	3
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:ASSIGNED VALUE,18			18
WASTE QUANTITY CUBIC YDS	1		
DRUMS	0		
GALLONS	0		
TONS	0		
TOTAL	1 CU. YDS	1	1
TOTAL WASTE CHARACTERISTICS SCORE:			19
5. TARGETS			
GROUND WATER USE		3	9
DISTANCE TO NEAREST WELL AND	530 FEET MATRIX VALUE	40	40
TOTAL POPULATION SERVED	390841 PERSONS		
NUMBER OF HOUSES	0		
NUMBER OF PERSONS	0		
NUMBER OF CONNECTIONS	102853		
NUMBER OF IRRIGATED ACRES	0		
TOTAL TARGETS SCORE:			49

GROUND WATER ROUTE SCORE (Sgw) = 63.33

HRS SURFACE WATER ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	ROUTE NOT SCORED		N/A
2. ROUTE CHARACTERISTICS			
SITE LOCATED IN SURFACE WATER			
SITE WITHIN CLOSED BASIN			
FACILITY SLOPE			
INTERVENING SLOPE			
24-HOUR RAINFALL			
DISTANCE TO DOWN-SLOPE WATER			
PHYSICAL STATE			
TOTAL ROUTE CHARACTERISTICS SCORE:			N/A
3. CONTAINMENT			N/A
4. WASTE CHARACTERISTICS			
TOXICITY/PERSISTENCE:			
WASTE QUANTITY CUBIC YDS			
DRUMS			
GALLONS			
TONS			
TOTAL			
TOTAL WASTE CHARACTERISTICS SCORE:			•N/A
5. TARGETS			
SURFACE WATER USE			
DISTANCE TO SENSITIVE ENVIRONMENT			
COASTAL WETLANDS			
FRESH-WATER WETLANDS			
CRITICAL HABITAT			
DISTANCE TO STATIC WATER			
DISTANCE TO WATER SUPPLY INTAKE AND TOTAL POPULATION SERVED	MATRIX VALUE		
NUMBER OF HOUSES			
NUMBER OF PERSONS			
NUMBER OF CONNECTIONS			
NUMBER OF IRRIGATED ACRES			
TOTAL TARGETS SCORE:			N/A

SURFACE WATER ROUTE SCORE (Ssw) = 0.00

HRS AIR ROUTE SCORE

CATEGORY/FACTOR	RAW DATA	ASN. VALUE	SCORE
1. OBSERVED RELEASE	NO	0	0

2. WASTE CHARACTERISTICS

REACTIVITY: MATRIX VALUE

INCOMPATIBILITY

TOXICITY

WASTE QUANTITY CUBIC YARDS
DRUMS
GALLONS
TONS

TOTAL

TOTAL WASTE CHARACTERISTICS SCORE: N/A

3. TARGETS

POPULATION WITHIN 4-MILE RADIUS
0 to 0.25 mile
0 to 0.50 mile
0 to 1.0 mile
0 to 4.0 miles

DISTANCE TO SENSITIVE ENVIRONMENTS
COASTAL WETLANDS
FRESH-WATER WETLANDS
CRITICAL HABITAT

DISTANCE TO LAND USES
COMMERCIAL/INDUSTRIAL
PARK/FOREST/RESIDENTIAL
AGRICULTURAL LAND
PRIME FARMLAND
HISTORIC SITE WITHIN VIEW?

TOTAL TARGETS SCORE: N/A

AIR ROUTE SCORE (Sa) = 0.00

HAZARD RANKING SYSTEM SCORING CALCULATIONS
FOR
SITE: NAVTELL
AS OF 07/12/90

GROUND WATER ROUTE SCORE

ROUTE CHARACTERISTICS		13
CONTAINMENT	X	3
WASTE CHARACTERISTICS	X	19
TARGETS	X	49

= 36309 /57,330 X 100 = 63.33 = S_{gw}

SURFACE WATER ROUTE SCORE

ROUTE CHARACTERISTICS		0
CONTAINMENT	X	0
WASTE CHARACTERISTICS	X	0
TARGETS	X	0

= 0 /64,350 X 100 = 0.00 = S_{sw}

AIR ROUTE SCORE

OBSERVED RELEASE 0 /35,100 X 100 = 0.00 = S_{air}

SUMMARY OF MIGRATION SCORE CALCULATIONS

	S	S^2
GROUND WATER ROUTE SCORE (S_{gw})	63.33	4010.69
SURFACE WATER ROUTE SCORE (S_{sw})	0.00	0.00
AIR ROUTE SCORE (S_{air})	0.00	0.00
$S^2_{gw} + S^2_{sw} + S^2_{air}$		4010.69
$\sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}$		63.33
$S_M = \sqrt{(S^2_{gw} + S^2_{sw} + S^2_{air})}/1.73$		36.61

SSI PHASE I
RECONNAISSANCE DOCUMENTATION CHECKLIST

This information is required for all SSI Phase Is. Much of it will be detailed in your letter report, logbook, or topo map. In such cases, provide only brief descriptions and reference citations on the checklist to avoid duplication. Cite the source for <u>all</u> information obtained for <u>all</u> sections. Lists of HRS-specific definitions and sensitive environment identifications are attached.

Site Name: Navtell

City, County, State: Ft. Lauderdale, Broward, Florida

EPA ID No.: FLD118624188

Person responsible for form: S. Panabaker

Date: July 12, 1990

DESKTOP DATA COLLECTION

(Can be done before or after recon. Include attachments as necessary).

I. **Groundwater Use** (See project geologist for this information)

- Identify aquifer(s) of concern.

  Biscayne aquifer (Ref. 9).

- Identify any areas of karst terrain within the 4-mile site radius, and confining layers and hydraulic interconnections within 2 miles of the site.

  The Biscayne aquifer is not considered karst terrain even though there are solution cavities in the limestone (Ref. 10).

II. **Surface Water Use**

- Identify uses along the 15-stream-mile surface water pathway (i.e. drinking water, fishing, irrigation, industrial).

  N/A - The surface water at the site either percolates into the ground or is channeled by storm water drains into the ground (Ref. 16).

- Identify any designated recreational areas, sensitive environments, and fisheries along the surface water pathway. Specify whether fishing is recreational, subsistence, or commercial. Information for smaller water bodies can be confirmed or obtained from local sources during the recon.

  There is no pathway since surface water is channeled directly into the ground via french drains.

III. **Sensitive Environments**

- Identify any sensitive environments within 4 radial miles of the site (See Table 4-23 of the February 15, 1990 HRS Draft Final Rule, attached). Remember, sensitive environments are not limited to critical habitats.

  See References 17, 18, 19, 20

DRIVE-BY RECONNAISSANCE DATA COLLECTION
(This information should be recorded in logbooks with attachments).

I. **Groundwater Use** (This information can generally be obtained from local water departments, or city hall in rural areas).

- Identify on copies of topos the extent of all municipal systems and areas served by private wells within 4 miles of the site.

  See Reference 6

- Locate on copies of topos all municipal well locations in the site area, including any wells of a blended system >4 miles from site. Specify if water from these wells is partially or fully blended prior to or during distribution, and if any surface water intakes contribute to a blended system (whether or not they draw from the target sw pathway).

  See Reference 6

- Note the depth, pumpage, and population served for all municipal wells within the 4-mile site radius. Complete well survey forms.

  See Reference 6

- Document other groundwater uses (e.g. irrigation, industrial).

  Unknown

II. **Surface Water Use**

- Identify on topos the 15-mile surface water pathway.

  N/A

- Identify and locate on topos any surface water intakes within 15 miles downstream of the site (to be obtained from local water department).

  N/A

III. **Site and Area Use Data Collection** (May be obtained before or during recon)

- Describe any barriers to travel (e.g. rivers) within 1 mile of the site (consult topo).

  No barriers have been identified within 1 mile of the site.

- Describe population within the immediate site vicinity and within the 4-mile radius (e.g. sparsely populated rural areas, commercial/industrial areas, densely populated urban areas, etc.).

  The site is located in an industrial/commercial area adjacent to the Ft. Lauderdale Executive Airport.

- Obtain aerial photos of site and immediate vicinity whenever available (from county offices).

  Yes, located in Florida section office.

- Note if the facility is on sewers or septic tanks (consult water or public works department).

  Unknown

- Obtain current property owner information from the county tax assessor's office.

  CB Institutional Fund VI
  c/o Property Evaluation Services
  1211 Hamburg Turnpike
  Suite 201
  Wayne, New Jersey 07470

CERCLA ELIGIBILITY QUESTIONNAIRE

Site Name: Nautell

City: Ft. Lauderdale State: Florida

EPA ID Number: FLD118624188

I. CERCLA ELIGIBILITY	Yes	No
Did the facility cease operations prior to November 19, 1980?	___	X

If answer YES, STOP, facility is probably a CERCLA site.

If answer NO, Continue to Part II.

II. RCRA ELIGIBILITY	Yes	No
Did the facility file a RCRA Part A application?	___	X
If YES:		
1. Does the facility currently have interim status?	___	X
2. Did the facility withdraw its Part A application?	___	X
3. Is the facility a known or possible protective filer? (facility filed in error)	___	X
4. Type of facility: Generator________ Transporter_______ Recycler_______ TSD (Treatment/Storage/Disposal)________		
Does the facility have a RCRA operating or post closure permit?	___	X
Is the facility a late (after 11/19/80) or non-filer that has been identified by the EPA or the State? (facility did not know it needed to file under RCRA)	___	X

If all answers to questions in Part II are NO, STOP, the facility is a CERCLA eligible site.

If answer to #2 or #3 is YES, STOP, the facility is a CERCLA eligible site.

If answer #2 and #3 are NO and any OTHER answer is YES, site is RCRA, continue to Part III.

III. RCRA SITES ELIGIBLE FOR NPL	Yes	No
Has the facility owner filed for bankruptcy under federal or state laws?	___	___
Has the facility lost RCRA authorization to operate or shown probable unwillingness to carry out corrective action?	___	___
Is the facility a TSD that converted to a generator, transporter or recycler facility after November 19, 1980?	___	___

NAVTELL
FLD118624188
PRELIMINARY ASSESSMENT

F.L.E.W.

A. SITE DESCRIPTION. This site is located in a commercial/industrial area at 3331 NW 55 Street, Fort Lauderdale, Broward County, Florida. Navtell was involved in the repair and sales of data communications test equipment. It is not known how long Navtell was located at this site but it was apparently in operation through the summer of 1984. N.B.C. of Broward is now located at this site. There is no information on N.B.C. of Broward.

B. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS. Approximately 20 gallons per year of cleaning solvents were used at this facility. Any spent solvents were contained in various small containers until they were picked up by municipal trash collection. Soldering was also done at this facility.

C. NATURE OF HAZARDOUS MATERIALS. Twenty (20) gallons per year of cleaning solvents were used at this facility. The chemical composition of the solvent is unknown, however, we assume that it is toxic, flammable and volatile. It is not known if any hazardous substances are presently used onsite.

D. ROUTES OF CONTAMINATION. Possible routes of contamination include groundwater, surface water and direct contact.

E. POSSIBLE AFFECTED POPULATION AND RESOURCES. Area residents are provided with drinking water from the city of Fort Lauderdale Executive/Prospect municipal wellfield. The wellfield draws from the Biscayne aquifer, which is a shallow, permeable, sole-source aquifer. The site is located within 1000 feet of the nearest well, thus potential contaminants in the groundwater, surface water or soil on-site may contaminate the wellfield.

The facility was located within 1000 feet of the nearest body of water, thus potentially contaminated groundwater or surface runoff could contaminate surface water supplies, affecting recreational users and aquatic flora and fauna.

Workers may have been exposed to hazardous substances via inhalation of volatilized cleaning solvent or direct contact.

F. RECOMMENDATIONS AND JUSTIFICATIONS. There is no information about N.B.C. of Broward, which is now located at this site. Since the amount of waste generated per year was small when Navtell was located on-site, we recommend a low priority for inspection at this site.

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION — 01 STATE: FL — 02 SITE NUMBER: D118624

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site): Navtell	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER: 3331 NW 55th Street
03 CITY: Fort Lauderdale	04 STATE: FL — 05 ZIP CODE: 33309 — 06 COUNTY: Broward — 07 COUNTY CODE: 011 — 08 CONG DIST: 017
09 COORDINATES — LATITUDE: 26 11 55. — LONGITUDE: 0 80 11 30.	

10 DIRECTIONS TO SITE (Starting from nearest public road)

Proceed north from Ft. Lauderdale on I-95. Exit at Commercial Blvd. and proceed west 2 miles to NW 31 Ave. Turn right on NW 31 Ave. and proceed north ½ mile to Prospect Rd. Turn left on Prospect Rd. and proceed 3/4 mile to NW 35 Ave. Turn left on NW 35 Ave. and turn left onto NW 55 Street. The site is located on the left in the Business Plaza.

III. RESPONSIBLE PARTIES

01 OWNER (If known): Same as above.	02 STREET (Business, mailing, residential):
03 CITY:	04 STATE: — 05 ZIP CODE: — 06 TELEPHONE NUMBER: ( )
07 OPERATOR (If known and different from owner): Linda Johnston	08 STREET (Business, mailing, residential): 3331 NW 55th Street
09 CITY: Ft. Lauderdale	10 STATE: FL — 11 ZIP CODE: 33309 — 12 TELEPHONE NUMBER: (305) 486-7122

13 TYPE OF OWNERSHIP (Check one)

- [X] A. PRIVATE ☐ B. FEDERAL: ______ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
- ☐ F. OTHER: ______ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: __/__/__ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__ (MONTH DAY YEAR) [X] C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION: [X] YES ☐ NO — DATE: __/__/__ (MONTH DAY YEAR)

BY (Check all that apply): ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR ☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: ______ (Specify)

CONTRACTOR NAME(S): ______

02 SITE STATUS (Check one): [X] A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION: ______ BEGINNING YEAR | ______ ENDING YEAR [X] UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

This facility repaired and sold data communications test equipment. Cleaning solvents were used at the rate of 20 gallons per year. Spent solvents were put in small containers and picked up by a municipal collector.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Spills of cleaning solvent could contaminate groundwater, drinking water, surface water and soils. Workers may also come in direct contact with cleaning solvent.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) [X] C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT: Eric Nuzie Cortland S. Hill	02 OF (Agency/Organization): FDER			03 TELEPHONE NUMBER: (904) 488-0190
04 PERSON RESPONSIBLE FOR ASSESSMENT: Willard Murray	05 AGENCY: N/A	06 ORGANIZATION: E.C. Jordan Co.	07 TELEPHONE NUMBER: (207) 775-5401	08 DATE: 11/6/85 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

MEM

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
FL	D118624188

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [ ] A. SOLID
- [ ] B. POWDER, FINES
- [ ] C. SLUDGE
- [ ] D. OTHER ______ (Specify)
- [ ] E. SLURRY
- [x] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS: Unknown
CUBIC YARDS: Unknown
NO. OF DRUMS: Unknown

03 WASTE CHARACTERISTICS (Check all that apply)

- [x] A. TOXIC
- [ ] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [x] G. FLAMMABLE
- [ ] H. IGNITABLE
- [x] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [ ] K. REACTIVE
- [ ] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			This facility generates small
OLW	OILY WASTE			quantities of spent solvents which
SOL	SOLVENTS	20 gal/yr		were stored in various small con-
PSD	PESTICIDES			tainers until they were picked up
OCC	OTHER ORGANIC CHEMICALS			by a municipal trash collector.
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SOL	Cleaning Solvent	999	Small containers	Unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers) N/A

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

BC[illegible] Hazardous Waste Survey, 8/9/84

EPA

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D1186241

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+
04 NARRATIVE DESCRIPTION

Spills of spent solvents from various small containers stored on-site may contaminate the groundwater. No spills have been reported and no samples have been taken.

01 [X] B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+
04 NARRATIVE DESCRIPTION

This facility is located within 1000 feet of the nearest body of water. Therefore, potentially contaminated surface water runoff or groundwater could contaminate nearby surface waters.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: ________) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION

Remote potential. The amount of waste generated is very small, thus, posing little threat to the general air quality.

01 [X] D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1-100
04 NARRATIVE DESCRIPTION

The cleaning solvents used on-site are most likely volatile or flammable. However, no incidents of fire have been reported.

01 [X] E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 1-100
04 NARRATIVE DESCRIPTION

The workers may come in direct contact with cleaning solvents which may be toxic and volatile.

01 [X] F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 0.5 (Acres)
04 NARRATIVE DESCRIPTION

Spills of spent solvents may contaminate the soil on-site. No spills have been reported and no soil samples have been taken.

01 [X] G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+
04 NARRATIVE DESCRIPTION

Area residents are provided with drinking water from the Ft. Lauderdale Executive/ Prospect municipal wellfield which produces from the shallow, permeable Biscayne aquifer. The site is located 1000 feet from the nearest well, and potential contaminants in the groundwater may reach the wellfield.

01 [X] H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: 1-100
04 NARRATIVE DESCRIPTION

Workers may be exposed to hazardous substances via inhalation of volatilized compounds or direct contact with cleaning solvent. Workers may also be injured in the event of a fire.

01 [X] I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: ________) — [X] POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 10,000+
04 NARRATIVE DESCRIPTION

Area residents may be exposed to contaminants via drinking water, groundwater used for irrigation and other purposes, or surface water.

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
FL	D118624188

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: ________) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Contact with contaminants may damage plant life. There was no observed damage to the grass and trees on-site during the windshield survey, 8/14/85.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: ________) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

Contact with contaminants may injure wildlife, however, the facility is located in a commercial/industrial area and no wildlife was observed during the windshield survey, 8/14/85.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Remote potential. The solvents stored on-site do not generally bioaccumulate.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0
04 NARRATIVE DESCRIPTION

None reported.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None reported.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

None known.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 10,000+

IV. COMMENTS

N.B.C. of Broward is now located on this site. There is no information in the file concerning N.B.C. of Broward.

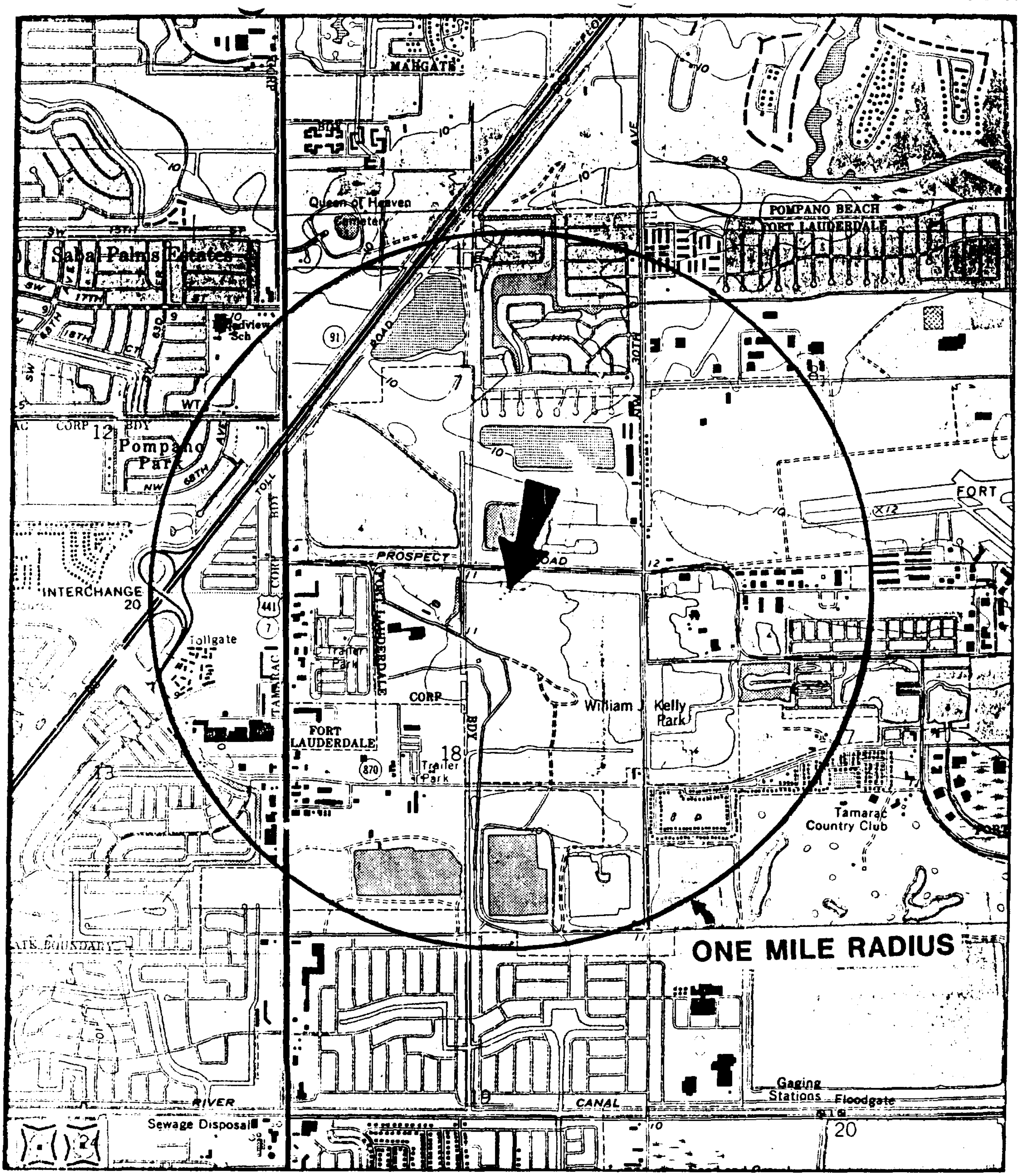
V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

See attached reference list.

ATTACHMENT A
NAVTELL
FLD118624188

ON-SITE INSPECTIONS

DATE	AGENCY	SAMPLES	COMMENTS
08/14/85		No	Off-site windshield survey. N.B.C. of Broward now occupie this site.
08/09/84	BCEQCB	No	Hazardous Waste Survey



SCALE 1 : 24000

0 1/2 1 MILE

1000 0 1000 2000 FEET

N

SITE LOCATION MAP

Navtell

3331 NW 55th Street

USGS QUAD Ft. Lauderdale North

DATE 1983

E.C.JORDAN CO.

REFERENCE LIST

1. Environmental Protection Agnecy, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH; Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Florida Department of Natural Resources, Water Resources of Broward County, Report of Investigation No. 65, 1973.

6. Florida Division of Geology, Chemical Quality of Waters of Broward County, Florida, Report of Investigations No. 51, 1968.

7. Florida Geological Survey, Biscayne Aquifer of Dade and Broward Counties, Florida, Report of Investigation No. 17, 1958.

8. Florida Geological Survey, Groundwater Resources of the Oakland Park Area of Eastern Broward County, Florida, Report of Investigation No. 20, 1959.

9. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

10. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

11. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1. NUS Corporation, Superfund Division.

12. NUS Training Manual, Project for Performance of Remedial Reponse Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

13. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

14. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

15. U.S. Geological Survey, Topographic Map, 1-24,000 Series.

16. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.

REFERENCE LIST

1. Environmental Protection Agnecy, Federal Register, National Oil and Hazardous Substances Contingency Plan, Part V, July 16, 1982.

2. Farm Chemicals Handbook, Willoughby, OH; Meister Publishing Company, 1982.

3. Florida Department of Environmental Regulation, The Sites List, Summary Status Report, July 1, 1983 - June 30, 1984.

4. Florida Department of Environmental Regulation, 3012 Folder, 2600 Blairstone Road, Tallahassee, Florida. To be used for completion of Preliminary Assessment, Form 2070-12.

5. Florida Department of Natural Resources, Water Resources of Broward County, Report of Investigation No. 65, 1973.

6. Florida Division of Geology, Chemical Quality of Waters of Broward County, Florida, Report of Investigations No. 51, 1968.

7. Florida Geological Survey, Biscayne Aquifer of Dade and Broward Counties, Florida, Report of Investigation No. 17, 1958.

8. Florida Geological Survey, Groundwater Resources of the Oakland Park Area of Eastern Broward County, Florida, Report of Investigation No. 20, 1959.

9. Health and Safety Plan, Florida 3012 Program, E.C. Jordan Co., June 1984.

10. Healy, Henry G., 1977, Public Water Supplies of Selected Municipalities in Florida, 1975: U.S. Geological Survey, Water-Resources Investigations 77-53, p. 309.

11. NUS Project for Performance of Remedial Response Activities at Uncontrolled Hazardous Substance Facilities--Zone 1. NUS Corporation, Superfund Division.

12. NUS Training Manual, Project for Performance of Remedial Reponse Activities at Uncontrolled Hazardous Substance Facilities--Zone 1, NUS Corporation, Superfund Division.

13. Sax, N. Irving, Dangerous Properties of Industrial Materials, Sixth Edition, Van Nostrand Reinhold Co., 1984.

14. TLVs Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1983-84, American Conference of Governmental Industrial Hygienists, ISBN: 0-936712-45-7, 1983.

15. U.S. Geological Survey, Topographic Map, 1-24,000 Series.

16. Windholz, M., ed. The Merck Index, an Encyclopedia of Chemicals and Drugs, Rahway, NJ: Merck and Company, Inc., 1976.